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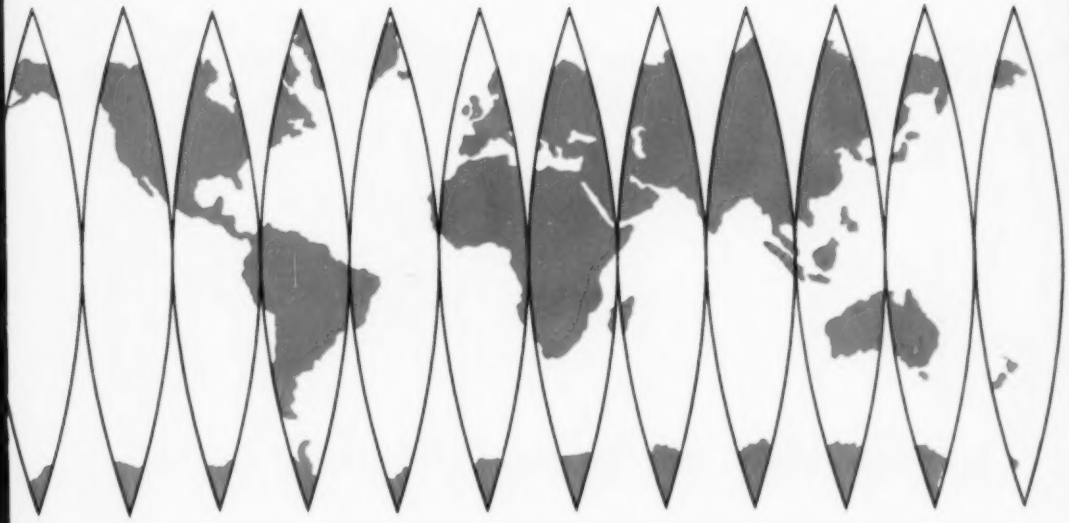

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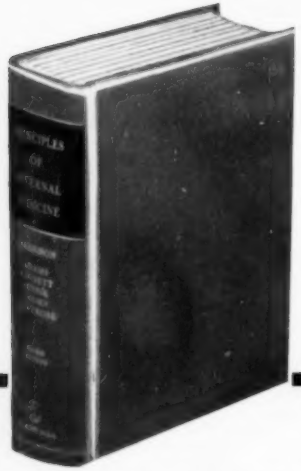

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Items of Current Interest: Audio-visual news and notices from national and federal agencies appear in this section.

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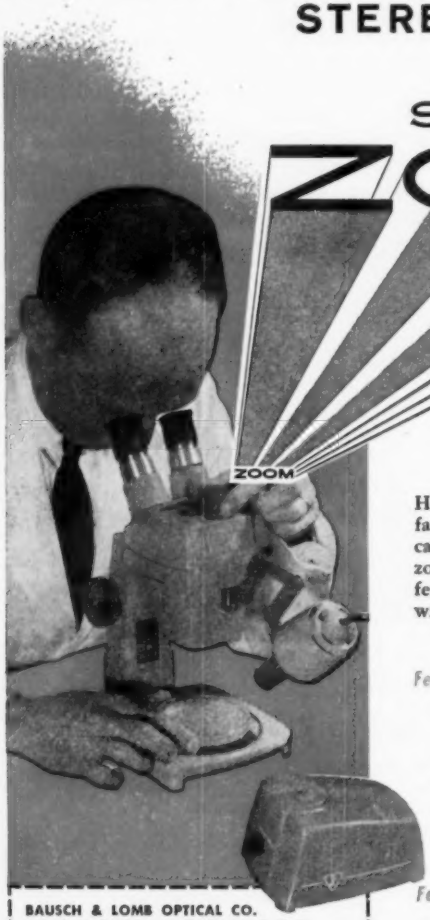

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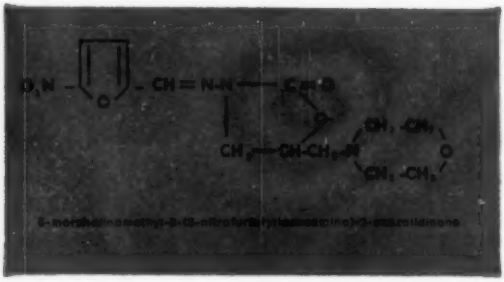

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D. pneumoniae	14	0	100.0
Coliforms	34	3	91.8
Proteus	5	5	50.0
A. aerogenes	8	0	100.0
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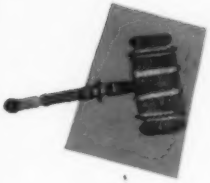
Meetings



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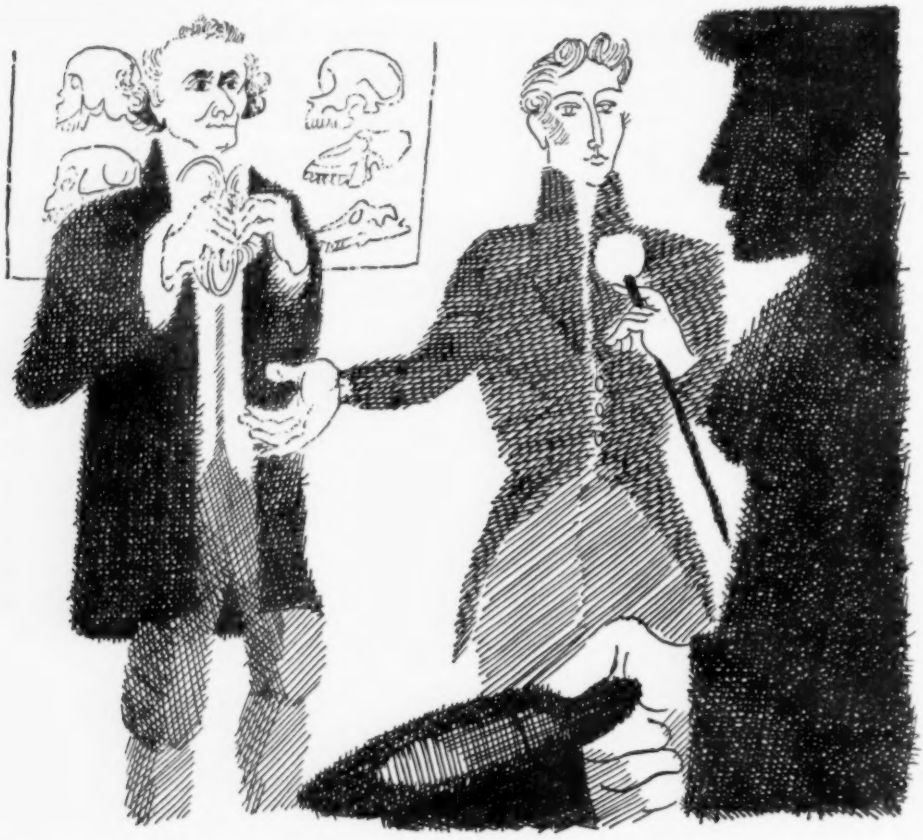

A STUDENT MEETS JOHN HUNTER

"On his arrival in London, Mr. Thomas, in company with Mr. Nicol, by whom he was to be introduced, called on Hunter: they found him dressing. 'Well, young gentleman,' said Hunter, when the first ceremonies of introduction were over, 'so you are come to town to be a surgeon; And how long do you intend to stay?' 'One year,' was the reply. 'Then,' said he, 'I'll tell you what, that won't do; I've been here a great many years, and have worked hard too, and yet I don't know the principles of the art.' After some further conversation, Mr. T. was directed to call again in an hour, which he did and accompanied Hunter to the hospital [St. George's], where he said to him, after the business was over, 'Come to me to-morrow morning, young gentleman, and I will put you further in the way of things; come early in the morning, as soon after four as you can.' It was summer: Mr. Thomas kept the appointment, and found Hunter, at that early hour, busily engaged in dissecting beetles."

DREWRY OTTLEY, M.R.C.S.
(*The Life of John Hunter, F.R.S.*, 1835)

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THE STATEMENT QUOTED on the opposite page sums up our philosophy as medical publishers serving medical education. We would like to add only one particular. To serve the many types of schools and students—in and out of school—we must continue to publish a wide variety of books and periodicals. To this end we have developed, over the last fifty years, through our domestic publishing efforts as well as through our long-standing alliances with half-a-dozen overseas publishers, a list of hard-back and journal publications that is unsurpassed in length by any other medical publisher on this continent. We submit this statement of our "bigness" simply as an indication of the confidence placed in us by authors, editors, national societies, as well as other publishers.

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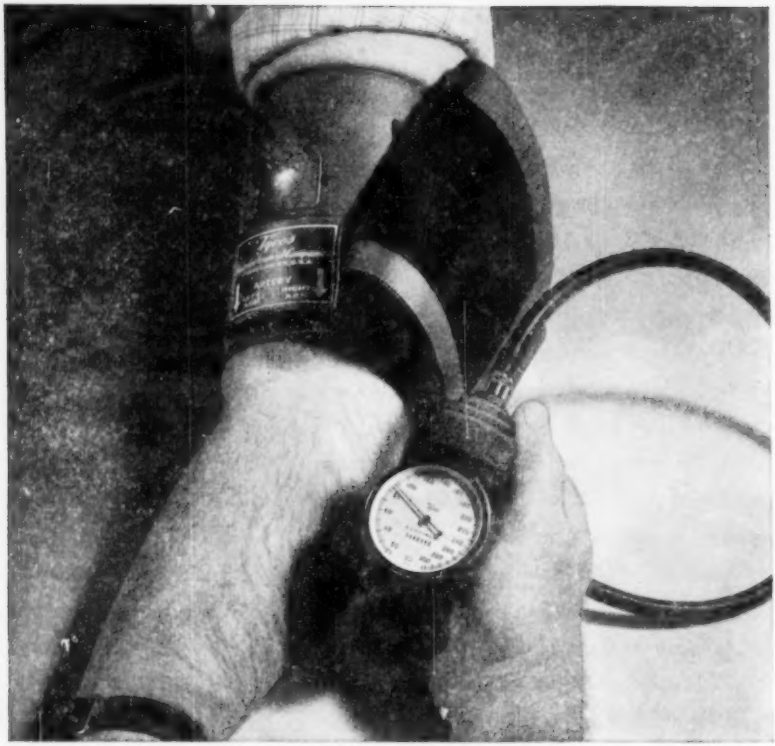

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The Journal of MEDICAL EDUCATION

VOLUME 34 • NUMBER 8 • AUGUST, 1959

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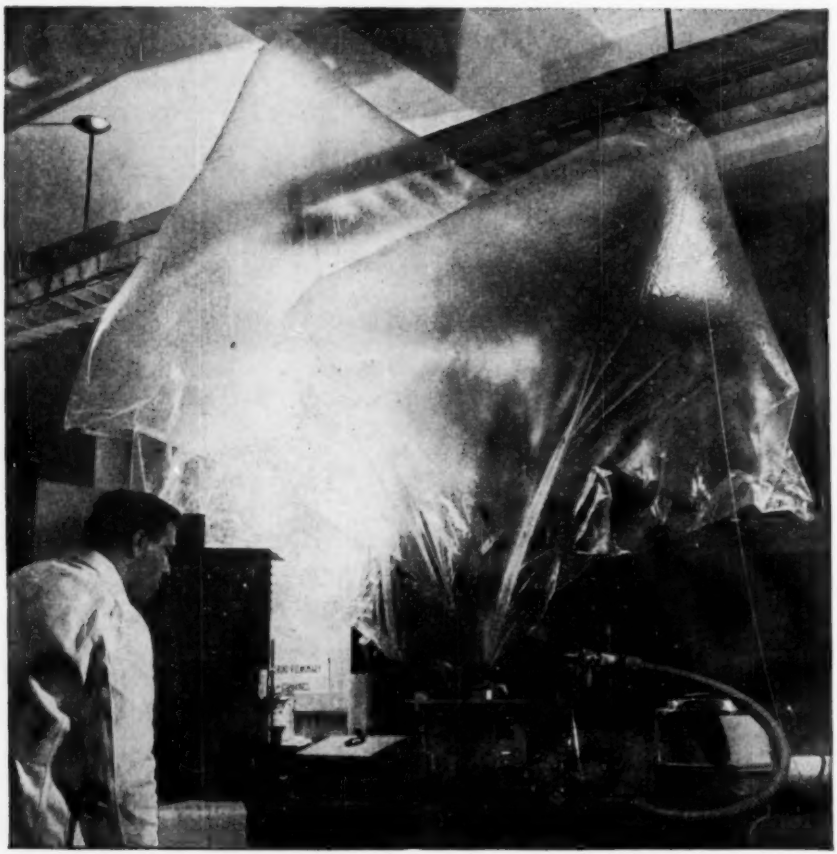
"Lung" at work

In this experiment at the National Heart Institute a researcher compiles data on the work of breathing. He is studying resistance to air flow within the respiratory passages of a model human lung.

The large plastic bags contain known mixtures of gases. An ordinary vacuum cleaner (right) draws these gases through the lung model (glass jar, center). Gas flow and pressure are recorded by the instrument at the left.

Basic studies such as this are advancing our understanding of the physics and chemistry of normal and impaired pulmonary ventilation. Lakeside Laboratories, Inc., Milwaukee 1, Wisconsin.



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Message from the Secretary-General of the United Nations to the Second World Conference on Medical Education

I am glad to send a message of good will on the occasion of the Second World Conference on Medical Education. It is clear that the Conference represents another important development in furthering international cooperation in medical education.

The United Nations and its family of Specialized Agencies, each in its respective fields, are constantly made aware of the importance of education in the direction of international cooperation. The United Nations became the focal point for several of the largest meetings of scientists held in recent years when it convened in Geneva its two Conferences on the Peaceful Uses of Atomic Energy. A very large part of the work of UNESCO and of the World Health Organization is connected with the spread of education in scientific fields.

International organizations do not act alone. They represent the sum total of the interests and the efforts of the peoples and the communities in the world at large. The Second World Conference on Medical Education is an example of an initiative of great importance to the peoples of the world, and therefore to the United Nations.

DAG HAMMARSKJÖLD
Secretary-General

Message from the Director-General of the World Health Organization

It would be surprising if the concept of efficiency had not penetrated the subject of medical education. Traditional curricula and methods of teaching have in fact come frequently under the scrutiny of medical educators, and one of their aims has been to utilize more effectively the already long period of six to eight years as a broad and solid basis on which general practice, postgraduate education, and specialization may be built. Another aim has been to adapt the content of teaching and experience to the type of medical work that is open to new graduates. For the latter purpose the profession itself has a great contribution to make. No other group could bring to bear more directly on medical teaching the lessons learned in everyday practice as it has evolved; no others could pass on more objectively the knowledge and experience that medical courses during their own student years had failed to provide, the preparation they had missed when confronted with the demands of their patients and of society at large.

The people themselves have a stake in this. The public authorities can indicate the anticipated developments of public services. They take an interest in, and are often ready to provide financial support for, the promotion of medical education and its collateral medical research. They offer employment, support universities, give grants to medical schools and fellowships to individuals.

It is clear that medical education is a matter of wide public concern. Those who are responsible for its promotion can be assured of the interest and assistance of the medical profession and of the public authorities. It is in this context that the cooperation of the World Health Organization with the World Medical Association can be carried through in sponsoring the Second World Conference on Medical Education. The public, the profession, and the medical school all stand to gain from joint efforts toward better medical education, both basic and postgraduate. The well-being of man, wherever he lives, is in the balance, because it depends in a large degree on the competence of the physician to provide both to the individual and to the community the services required for the prevention and cure of illness, and the restoration of the disabled.

M. G. CANDAU
Director-General of the World Health Organization

Foreword

The international scope of *The Journal of Medical Education* is well exemplified by the global representation featured in this issue. No effort has been made to be comprehensive; some manuscripts were solicited, others were submitted. Several articles discuss general developments, including the activities of the A.A.M.C., the Council on Medical Education and Hospitals of the A.M.A., WHO and international trends, and medical education in the International Health Organizations. Reports from four Foundations are included in the "Medical Education Forum" section. In addition, articles from the following countries are of special interest and significance, each including a preliminary summary in the native language of that geographic area:

Africa	Mexico
Brazil	New Zealand
Canada	Sweden
Chile	Taiwan
Denmark	United Kingdom
India	U.S.S.R.
Iran	U.S.A.

JOHN Z. BOWERS
Editor-in-Chief

Medical Schools in Africa: A Short Historical and Contemporary Survey

GEORGE W. GALE, M.Sc. (South Africa), M.B., Ch.B., D.P.H., D.T.M. & Hy. (Edin).*
Dept. of Preventive Medicine, Makerere Medical School, Kampala, Uganda, East Africa

Shule kamili ya utabibu hapo zamani ulimwenguni ilikuwa Afrika. Hii ilikuwa shule ya utabibu huko Alexandria. Nayo iliendelea sana kwa muda wa Karne nyingi kabla na baada ya kuzaliwa kwa Kristo. Kisha ilipotea na hapakuwa na shule ya utabibu katika ardhi ya Afrika mpaka 1827. Katika mwaka huu Shule ya utabibu ilianzishw huko Kairo. Shule nyingine mbili zimeanzishw Misri—Alexandria 1942 na Ein Shaims karibu na Cairo 1947. Katika Afrika ya kusini shule za utabibu zilianzishw, Cape Town 1919, Johannesburg (Witwatersrand)1920, Pretoria 1942, Durban 1952 na Stellenbosch 1957. Kila moja ya hizi hutoa digrii kamili ya utabibu ambayo inakubaliwa katika Uingereza na Afrika ya kusini vile vile. Shule ya Durban haiwaruhusu watu wasio Wazungu. Katika hizi nne zinazobaki, ni Cape Town na Johannesburg tu, zinazokubali kufundisha wasio Wasungu. Juzi juzi, serkali ilipitisha sheria ya kuzuia wasio Wazungu kuingia shule hizi, ingawa wakuu wa shule senyewe hawakukubaliana na serkali.

Shule zote hizo zilizotajwa hapo juu, zimekuwa zikitoa mafundisho ya utabibu kamili tokea mwanzo. Katika Sudani, Afrika ya mashariki. Afrika iliyo chini ya mamlaka ya Ufaransa na Nigeria, mafunzo kamili ya utabibu yameendelea sana kwa muda wa miaka kumi iliopita, kuanzia mafunzo ya kwanza ambayo hayakuwa ya kamili. Shule ya autbibu ya Sudani iko huko H Khartum, ya Afrika mashariki iko Kampala (Makerere College) na ya Afrika iliyo chini ya mamlaka ya Ufaransa iko Dakar, na ya Nigeria iko Ibadan. Ingawa shule kuwakubali wanafunzi wa mataifa yote walio wengi wao ni wenyeji wa inchi ambamo shule zenyewe zimo.

Shule ya utabibu ambayo imeanzishwa karibuni zaidi katika Afrika ("Tropical Africa") ni ile ya Leopoldville ambako University College ya Lovanium iliyoanzishwa 1957 hutoa mafunzo ya digrii ya utabibu ya chuo kikuu cha Louvain (Belgium). Kati ya wanafunzi hawa wawili wao ni weusi kua kila Mzungu mmjoa.

It intrigues and pleases African medical students to learn that for several centuries the greatest medical school in the world was in Africa and that it was here that the most influential physician of all time received the most important part of his medical education. It is indeed worth remembering that it was in Alexandria rather than in Greece itself that Greek medicine became organized, academically and professionally, and that thither went the young Galen of Pergamos, in the second century after Christ. It was largely through the writings of Galen that the influence of Greek medicine lived on, long after the extinction of the medical school of Alexandria and the break-up of the Roman Empire, through the Dark Ages and the Middle Ages until it met with and merged into the medicine of the Renaissance.

Centuries more were to pass before Greek medicine, through its descendant which today we call Western medicine, again found habitation in a medical school on African soil. Again its home was in Egypt, but not yet in Alexandria. It was in 1827 when there was founded what is today the oldest medical school in Africa, by nearly a century—the Kasr-El-Aini Faculty within the University of Cairo. Two more schools have since been established in Egypt—the Faculty of Medicine in the University of Alexandria in 1942 and the Abbassia Faculty in the University of Ein Shaims (Cairo) in 1947. A fourth school is being established at Assiut, 200 miles south of Cairo. The course given at all these schools is 6½ years long, including a pre-medical year taken in the Faculty of Science, and leads to the degree of M.B., Ch.B. The language of instruction is English.

Egypt, being geographically a part of the African continent, rightly comes within the

* Professor of Preventive Medicine, Makerere Medical School, and formerly Dean of the Durban Medical School.

scope of this survey. However, it differs, in one important feature, from the rest of Africa in that it has always—at any rate within modern times—had among its aboriginal inhabitants a literate class of appreciable size, from which medical students could be drawn. In the rest of Africa, literacy among the original inhabitants, as distinct from Asian and European settlers, was non-existent before the impact of the latter; and it is important, especially for those who have never lived in Africa, to bear this in mind when considering the development of medical schools in the continent south of the Sahara. In the whole of this area there are only six[1] schools providing a full training for Africans, whereas in Japan—which was opened to Western influences later than mosts parts of Africa, and has only two-thirds the population of Africa south of the Sahara—there are 46 schools giving full training in "Western" medicine.

The prerequisite for full training of Africans in medicine was the creation of primary and then of secondary schools where literally none had existed before. To this day, far less than half of all African children complete even a primary education, and only a very small fraction complete a secondary education. And in the New Africa, especially those parts of it which are becoming self-governing, there is a tremendous demand not only for doctors, but also for agriculturists, teachers, administrators, and many other professional categories all of which draw upon the very small pool of high school graduates. Carping critics of "colonialism" have expressed indignation that there are so few university institutions including medical schools in Africa; but, quite apart from the question of whether the economy of young developing territories could adequately support more, the plain fact is that the number of students eligible and available for training does not warrant more. For example, the University College of East Africa (Makerere College) is the only university institution in East Africa, with a population of 20 million Africans. But, although governmental financial support is available for all who are eligible academically, it was not until this year (1958) that the number of entrants into the College (all faculties) exceeded 200.

It is not surprising, therefore, that those responsible for the provision of medical services for vast aboriginal populations in territories with relatively meager financial resources, precluded as they were from importing (at great expense) large numbers of doctors from overseas, adopted the device of training local Africans as "medical assistants"—the nomenclature varies—to perform some of the functions which in Western countries would be carried out only by fully qualified persons. It is beyond the scope of this article to give an account of the very interesting history of all the schemes of this sort, many of which are still continuing, but mention will be made of those which were transformed into medical schools proper or in other ways have stood in a special historical relationship to medical schools subsequently established. Khartoum and Makerere were directly developed from schools for medical assistants, whereas at Dakar and Ibadan the present medical schools replaced older schools at Dakar and Lagos, respectively, which for many years had undertaken sub-standard training and were now closed down. Special mention may be made of an abortive attempt, in South Africa, to provide sub-standard medical training at the South African Native College of Fort Hare, an institution of university rank. The trainees were known as "medical aids." The scheme was abandoned in 1941 after only two or three batches of trainees had been produced.

The disadvantages of having two grades of medical practitioner—one very much inferior—in one and the same country are many and obvious. It was for this reason that the South African experiment was abandoned, for South Africa is the one territory in which there is no need to dilute the medical profession on account of shortage of numbers of fully trained persons. Elsewhere,

[1] I have not included four of the five schools in South Africa, for reasons which will be apparent later in this article.

policy for the future is now strongly in favor of full training without the institution or even the perpetuation of half-way schemes. Thus, if a medical school is established for the Federation of the Rhodesias and Nyasaland, which at present has none at all, it will be a faculty of the University College at Salisbury. As far as I am aware, the only African territory which has a medical school giving a sub-standard training, and has none giving a full training, is Madagascar. Here, at Tananarive, a 4-year course (given in French) leads to a diploma qualifying for practice within the governmental medical services for Madagascar and its dependencies, but not for practice in metropolitan France. Mention of the Tananarive Medical School brings one back to the chronological presentation with which this article commenced, for this School was developed from an even simpler one which was founded in 1896.

The next school to be founded was the Kitchener School of Medicine in Khartoum, established before the First World War. As already noted, at first it provided only a sub-standard training, but was later transformed into the Faculty of Medicine of the University College (now the University) of Khartoum. Today it provides a 6-year course (including 1 year pre-medical) leading to a qualification given by the University itself. After qualification, 2 years' work as a resident medical officer or intern is required before full registration—authority to practice independently—is granted by the State. Alternatively, the holder of the Khartoum qualification may proceed to the United Kingdom where, after only 1 year's further clinical study in a recognized school (not 3 years, as is usually required from students coming from other medical schools abroad), he may sit the final professional examination. Teaching at Khartoum is in English.

In 1918 there was established at Dakar a school for training Africans as "auxiliaries" in medicine, in midwifery, in pharmacy, and so forth for service in French West Africa—in 1944 extended to include French Cameroons and French Equatorial Africa. This school was closed in 1950 to make way for a new school, also at Dakar, which prepares its students for the French State Diploma. Teaching is in French. The School is part of the local university—the *Institut des Hautes Études de Dakar*—the Faculty of Science within which is responsible for the premedical year. Thereafter, the student spends 3 years studying the premedical sciences, in the third of which he commences clinical work at the local hospitals. The fifth and sixth years are spent, at present, at Bordeaux or some other medical school in metropolitan France. The seventh year—corresponding to internship in the British system—is spent in one of the hospitals in Dakar. It is intended to give the entire training in Dakar, as soon as the authorities are satisfied that this can be done without impairing the quality of the course as a whole. The School, like the University of which it is part, is open to the children of French residents and settlers as well as to Africans, but the latter are in a marked majority.

Apart from the lone medical school in Cairo, already noted as having been established in 1827, medical education of full standard was first provided in Africa by a university at the other end of the continent. The first beneficiaries, however, were not aboriginal Africans but the European settlers who, then as now, comprised a fifth of the population of the Union of South Africa. For many years South Africans of European descent—and, rarely, Africans—had been going to Europe for full medical training, returning to their homeland to reinforce those who had emigrated after qualification. Edinburgh, Dublin, and London were favorite centers. During the second decade of this century, the South African College in Cape Town, which in 1918 became the University of Cape Town, commenced classes for the "Second Professional" in anatomy and physiology. For some years, students who took these classes went to one or other of the British schools (there was no official relationship with any one school) for the final 3 years of the medi-

cal course, and obtained a British qualification. In the early twenties Cape Town began to provide the full course, leading to its own degree, and graduates appeared from 1923 onward. The University of the Witwatersrand, in Johannesburg, followed almost immediately, developing the full course year by year without any pause as there had been in Cape Town. The qualification obtained at either school entitled its holder to registration by the South African Medical and Dental Council and by the General Medical Council of Great Britain. In both universities the course was, and is, 6 years in duration, including the premedical year taken in the science faculty: but at that time there was no compulsory postgraduate internship year either in South Africa or in Great Britain. This was instituted in South Africa in 1947—three or four years in advance of Great Britain.

The Universities of Cape Town and of the Witwatersrand were legally open, then as now (October, 1958), to non-Europeans; but the very few Africans who were eligible for and wished to take a medical course, went overseas, in order to avoid the embarrassments of the social color bar. It is interesting to note, in this connection, that a Government committee[2] appointed to inquire into the training of Africans in medicine and in public health, in 1928 found that neither Cape Town nor the Witwatersrand favored the admission of Africans into their medical schools—they feared European public opinion—and the committee recommended the establishment of a separate school for Africans, of full standard and conducted by the University of the Witwatersrand. Nothing came of this recommendation.

In the Cape Town and Witwatersrand Schools instruction was given solely in English. Inevitably there grew up a demand from the Afrikaans-speaking section of the European population, who outnumbered the English-speaking, for a medical school in which Afrikaans would be the medium of instruction. It may be mentioned that the universities in South Africa derive most of their revenue from Government subsidies, so the demand was in itself a very reasonable one. The University of Pretoria in due course was empowered to set up a Faculty of Medicine in which Afrikaans was used almost exclusively, and the first graduates appeared at the end of 1947.

During this same period, the Witwatersrand School opened its doors to non-Europeans and Cape Town opened its doors to Coloureds and Indians.[3] The reason for this change of attitude, from that of 1928, was partly the growth of a more liberal spirit, under wartime influences, and partly that, in common justice, provision had to be made in South Africa for those Africans, eligible for medical education, who could no longer—because of the War—proceed overseas. The Government built a hostel in Johannesburg for non-European students (they were not admitted to the European student residences) and provided six medical bursaries annually for Africans. Cape Town did not admit Africans, not for any doctrinaire reason, but because there were insufficient beds for Africans in the teaching hospitals, and Coloureds and Indians would have objected to being examined by African students. (Non-European students at Cape Town are given clinical instruction only in non-European hospitals or wards, which are separate from the European.[4] Similarly, in Johannesburg, African students are taught only in "Native" [African] hospitals—which are also used for teaching European

[2] The Chairman of this committee was the late Dr. C. T. Loram, a South African by birth, who later became Professor of Race Relations at Yale University, U.S.A. The only survivor of the committee is Professor R. A. Dart, palaeo-anthropologist, who has recently retired from the chair of anatomy at the Witwatersrand University.

[3] "Coloureds," in S. Africa, are persons of mixed racial origin—not only Afro-Europeans, but also descendants of Malays introduced as slaves during the 17th and 18th centuries. The Indians, living mainly in Natal, but also in the Transvaal and the Cape Province, are descendants of Asian immigrants who entered Natal from 1860 to 1911, when immigration ceased.

[4] There were very few Africans in and around Cape Town at the time its medical school was opened to non-Europeans, the non-European population in the area being predominantly Coloured.

students, often in one and the same class. The non-European teaching hospitals are well staffed and well equipped, and the standard of clinical teaching is the same as in European hospitals).

Pretoria University does not admit non-Europeans to any of its faculties. The legality of this embargo has never been tested. The University of Stellenbosch, only 30 miles from Cape Town, has recently founded another Afrikaans-medium medical school, whose first graduates are due in 1960 or shortly after. As in the case of Pretoria, non-Europeans are debarred.

Thus, there are in South Africa (population 13 to 14 million) four medical schools for Europeans—two of them exclusively so, two of them admitting non-Europeans to the extent of about 5 per cent—which between them produce, or are capable of producing, some 400 graduates annually.

There is a fifth medical school. The same Government Committee which in 1938 recommended the establishment of the Afrikaans-medium medical school in Pretoria recommended also the establishment of a non-European medical school in Durban. After considerable pressure from the local University (of Natal) and from the Medical Association of South Africa, the Smuts Government agreed to assist specially in the building and support of a school in Durban —"primarily" for non-Europeans, but Europeans, particularly those who intended to practice among non-Europeans, would also be admitted if there was room. Before this promise could be implemented, the Smuts Government was defeated in the general election of 1948, by the Nationalist Party which is still in power (1958).

After more discussions, the Nationalist Government said it would provide funds for a non-European medical school in Durban if it were "exclusively" for non-Europeans. The University Council, which regarded this condition as interference with its autonomy, accepted the face-saving formula that it would admit European students only after reference, in each case, to the Minister of Education. (It is hard to imagine any Nationalist minister ever giving his consent!) It is only fair to record that, pending the opening of the new school in 1951, the Government, intensely as it disliked the admission of non-Europeans to the Witwatersrand School, nevertheless provided three bursaries annually for Africans who were admitted. The reduction from six to three bursaries was to indicate that it really did not approve. The shortage of bursaries was made good in the first instance by the (European) medical students at the Witwatersrand School itself, through a voluntary levy; and further support was soon forthcoming, and continues to be received, from all over South Africa and beyond. In 1951, when the Durban Medical School was opened, the Government cancelled its bursaries at Witwatersrand (but continued, *at the Witwatersrand*, the bursaries of those who were already there) and provided fifteen bursaries annually for entrants into the Durban School. It is appropriate here to mention that, although it is the openly avowed intention of the Government to make it illegal in the future for the "open universities" (Cape Town and the Witwatersrand) to admit non-European students, the necessary legislation has not yet (October, 1958) been enacted. Non-European students are thus still being admitted to these two schools. The Government has also threatened to remove the Durban Medical School from the control of the University of Natal to the direct control of the State. To this threat the present teaching staff replied that they would all (save one) resign immediately if it were carried out. The threat has not been carried out, but only, according to the Government, because it has not had time to prepare and carry through the necessary legislation.

Fears were expressed, when it was known that the Government had accepted 100 per cent financial responsibility for building and maintaining a separate medical school exclusively for non-Europeans, that the School would be inferior in construction and equipment to the existing schools for Europeans and that the staff would be paid less and

would therefore be unlikely to be of the same quality as elsewhere. These fears were falsified by the event. Although the School provides accommodation for only 40 students in each year (as compared with 100 or more in the other schools) the standards of construction and built-in equipment are actually superior to those in the schools built years before. Staff salaries are on the same scale as elsewhere, and the School was fortunate in securing, as its pioneer teachers, a team of able and enthusiastic men and women. The School, in which both the preclinical and the clinical departments are housed, stands immediately adjacent to the teaching hospital—the King Edward VIII Hospital for non-Europeans—which is one of the largest general and midwifery hospitals in the Commonwealth. It has some 1500 beds, produces over 25 tons of babies a year (8000 deliveries), and has a large staff of visiting specialists, registrars, medical officers, and resident interns. As compared with medical schools for Africans in other parts of Africa, with the possible exception of Egypt, the Durban School is fortunate in having the support of several hundred fully qualified practitioners, including specialists of every kind, practising in the hospitals and among the population of the area in which the School is situated.

The professional training given at Durban is the same in general content as that given in the other medical schools of the Union, and leads to a degree (M.B., Ch.B. of the University of Natal) which, after a year's internship, entitles its holder to registration in South Africa and by the General Medical Council of Great Britain. The 6-year course is preceded by a "Preliminary Year" whose purpose is, to quote myself when Dean, "to provide the student with a broader basis of general education before proceeding to his more specialized professional training. It is felt that this will help him, ultimately, from the professional viewpoint alone; and it will help him to make the kind of contribution to the cultural life of the community which is expected from members of the professions. During this year the students take full courses in English and in History, which in combination give them a better mastery of a western language and a better understanding of western cultural values and western institutions than, in general, they are able to acquire during their school days. They also take a full course in Botany and introductory courses in Physics and Chemistry. . . . In the First Year the subjects of study are Chemistry, Physics, Zoology, and Sociology." It is argued, by the supporters of non-segregation in South African medical schools, that the purpose of the preliminary year as described above would be equally well or indeed better achieved through cultural transfer and assimilation in a non-segregated school.

There is one respect in which, in the writer's opinion, the curriculum and teaching facilities at the Durban School are undoubtedly superior to those at other South African schools. Thanks to the generosity of the Rockefeller Foundation and the cooperation of the Natal Provincial Administration, there has been established a teaching Department of Family Practice equal in status to the departments of medicine, surgery, and gynecology and obstetrics. For teaching purposes, this department makes use of the Institute of Family and Community Health from which, over the past 10 years, there has been developed among the non-Europeans of Durban and its vicinity a system of medical and nursing care in which preventive and curative personal health services are fully integrated.

Although the Durban School has room for 40 students in each year, the average number is appreciably less; but if Cape Town and the Witwatersrand were to be prevented from admitting non-Europeans, it is likely that Durban would be full. In this connection, it may be mentioned that the School building is so designed that it could easily be extended to provide for 80 students in each year. An interesting point with regard to the student body in Durban is that about one fifth are women, in which it differs markedly from African student bodies in

other medical schools in Africa south of the Sahara, in which women students are rare. Makerere has not yet produced a woman graduate, whereas among the fourteen pioneer graduates at Durban, in 1957, there were three women.

After South Africa and the Soudan, the next territory—or, more strictly, group of territories—to provide facilities for full medical training was East Africa. Substandard medical training had been developed, from 1927 onward, as one of several courses available at Makerere College, in the Uganda town of Kampala. This College, although Uganda is the smallest of the three East African territories, was chosen for development into a university institution to serve all three. As part of this process the level of medical training was raised to full standard from 1946 onward. In 1949 the College received its charter as the University College of East Africa and in 1951 made the first award of its Licentiateship in Medicine and Surgery. Although the Licentiateship is given by the College itself, not by any external examining body, it has always been the practice to invite external examiners from other countries, mainly the United Kingdom, to assist not only in the final professional examinations but in the earlier ones too; and extrance to the medical faculty depends upon the passing of the Preliminary B.Sc. examination of the University of London, with which the College is in special relationship. At first the "L.M.S. (E.A.)" entitled its holders, after 2 years' internship, to registration (as medical practitioners) only in East Africa and Zanzibar; but in 1957 the General Medical Council (of Great Britain) announced that it was prepared to place all holders of the Licentiateship (plus 1 year's internship), from 1951 onward, on its registers.

The course at Makerere is 7 years in duration, the premedical period being, as at Durban and for much the same reasons, 2 years instead of the usual 1. As already noted, students take the Preliminary B.Sc. of the University of London, which qualifies them also for admission to the Faculties of Agriculture and of Veterinary Science at Makerere—each giving a full professional course—or they may remain in the Faculty of Science. Thus, those who are considered unsuitable or for whom there is not room—only 30 can, at present, be admitted to the medical school each year—have attractive alternatives open to them. At Makerere, as at Durban, preventive and social medicine is taught throughout the clinical period and is among the subjects of the final professional examination. Rather more than one third of the medical students, hitherto, have come from Kenya, rather less than a third from Uganda, and the remainder mainly from Tanganyika with a sprinkling from Zanzibar and the Rhodesias. The great majority are Africans, but there are a few Asians and coastal Arabs. Makerere has no color or racial bars, and it is possible that, now that G.M.C. recognition has been given to its medical Licentiateship, European students (from the settler communities in Kenya and Tanganyika) will be attracted to its medical school.

In West Africa, sub-standard medical training was provided from 1930 onward at the Yaba School at Lagos, but there was little continuity between this and the medical school commenced in 1948 by the University College of Nigeria at Ibadan, some 200 miles inland from Lagos. Unlike Makerere, the Nigerian College decided not to establish a qualification of its own, but to prepare its students for the medical degree of the University of London, with which it is in special relationship. This policy had the advantage that it would ensure recognition from the General Medical Council from the outset. However, in 1950 the University of London—not the General Medical Council—ruled that the teaching hospital at Ibadan had inadequate facilities for full medical training; and students who had already embarked upon the course had to be sent to London—and, in subsequent years, to various other British schools—for the clinical years, pending the erection of a teaching hospital with adequate facilities. The arrangement was thus, at this stage, similar

to that made initially at the Dakar Medical School. A very fine hospital, the University College Hospital, Ibadan, has now been completed, and clinical teaching can be given entirely at Ibadan. The first graduates of the school to have had all their training at Ibadan are due to appear in 1959. The teaching here, as at Makerere, is in English.

The youngest medical school in Africa is the medical faculty at Lovanium, on the outskirts of Leopoldville. Sub-standard medical training has been conducted for many years by the Government at a school in Leopoldville. Lovanium, however, has no connection with this. It owes its establishment, in 1956, to the initiative of the Belgian University of Louvain with which it is very closely affiliated and for the degrees of which—in arts, science, law, agriculture, engineering, as well as medicine—it will prepare students. Indeed, the teachers will move routinely between the Belgian and the Congolese sections of the University. To those interested in the broader aspects of education and acculturation, Lovanium is of special significance in the development of the New Africa, for the proportion of students of European descent (children of settlers and officials) to African students is much more nearly equal than in any other university institution in Africa. In South Africa there is complete segregation except at Joahnnesburg and Cape Town, where non-segregation may soon be abolished and where, in any case, only 5 per cent of the students are non-White. At Khartoum, Makerere, and Ibadan, while there are no racial or color bars, in fact, White students are a rarity; but at Lovanium a third of the students are White.

The medical course at Lovanium is the same in its content and duration—and language of instruction—as that in the parent university at Louvain, and thus leads to a qualification receiving full recognition in Belgium as well as in the Belgian Congo.

This completes the historical and contemporary survey of medical schools in Africa, but one may add to it a forward glance into the probably not far distant future in which two more schools will be added to the African scene. A strong independent committee has recently recommended to the newly established University College of Rhodesia and Nyasaland the creation, at Salisbury in Southern Rhodesia, of a medical school giving full training. Since the University College has neither racial nor color bars, such a school would attract both African and European students—probably, in the light of the experience of faculties already established, in nearly equal proportions, as at Lovanium. And from Ghana has come recently an announcement of intention to establish a full medical school within the University College of Ghana at Achimota.

Thus, within a century from Livingstone's death, there may well be at least seven medical schools of full status within the African Tropics, whose vast human needs his travels and writings did so much to reveal to the Western world. If, as one likes to think, the immortals of our profession know and are interested in what goes on in the world, how intriguing it would be to listen in to David Livingstone surveying medical schools in Africa jointly with Galen of Pergamos!

Postscript (June, 1959).—Legislation debarring non-Europeans from entry into S. African medical schools other than Durban has now been enacted by the S. African Government; but legislation to implement its intention to bring the Durban School under direct State control has not yet been announced. In December, 1958, the first African woman to do so obtained the Licentiateship of the Makere Medical School.

Method of Examination Used in the Course of Histology of the Escola Paulista de Medicina

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Os autores descrevem o método empregado para avaliar os conhecimentos adquiridos pelos alunos, no curso de Histologia e Embriologia da Escola Paulista de Medicina, São Paulo, Brasil.

O método consiste em testes, tanto da matéria teórica como da prática. Os teóricos, cuja duração é de 30 minutos, são constituidos de 60 perguntas com quatro alternativas, sublinhando o aluno aquela que achar ser a certa.

Nos testes práticos, também com quatro alternativas, são usados preferentemente tantos microscópios quantos alunos houverem. Em cada microscópio focaliza-se uma estrutura, que será assinalada com seta, ou um orgão (ocular sem seta).

Os alunos entram na sala achando os microscópios focalizados e em ordem numérica, de maneira a evitar entrecruzamento de movimentos (vide esquema). Recebem folhas mimeografadas com as questões numeradas. Colocam-se indistintamente frente a um microscópio aguardando as seguintes instruções:

1) iniciar o teste pelo número da questão que corresponde ao número do microscópio à sua frente.
2) nos microscópios sem seta, poderão deslocar os preparados.
3) naqueles com seta só poderão manejar o parafuso micrométrico.
4) o tempo é de um minuto para cada diagnóstico, dando-se após sinal de campainha avisando-os do rodízio, isto é, passagem para o microscópio de número imediatamente superior.

Após a elaboração dos testes práticos e teóricos, com lápis de côr, corrigem suas provas orientados pelo professor, atribuindo-lhes as notas correspondentes com auxílio da formula apresentada no texto.

O resultado dêsse método pode ser avaliado pelo gráfico que se encontra no texto.

For about 5 years we have been using certain tests in our department as a method of evaluation of general knowledge and, therefore, as an evaluation of the general results of teaching.

We are unconditional advocates of this method because, in this type of examination, where there is no contact with the students, personal antagonisms, fatigue of the examiner, an atmosphere of anxiety created by the students, etc. are all avoided.

Besides the serenity effected by this type of examination in which all reciprocal influence between examiners and students is eliminated, the homogeneity (the same questions presented to everyone at the same time), the sensation of lack of vigilance, and the correction and grading of the test by the pupils themselves, influence us to consider these tests more and more as the future method of evaluation of knowledge. During the course, theoretical and practical tests are given every 30 days. Theoretical tests are executed in the classic manner. The questions are presented each with four alternative answers (multiple choice), and the student underlines the answer he considers correct. The test has a time limit of 30 minutes and generally consists of 50–60 mimeographed questions.

At the end of the time limit, each student is supplied with a colored pencil for correcting the test with the orientation of the teacher who indicates orally the correct replies.

Correct and incorrect answers are counted (unanswered questions are not counted), and the grade is obtained by the following formula:

$$N = (C - \frac{E}{n-1}) K$$

N = final grade,
C = number of correct answers,

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E = number of wrong answers,
n = number of alternatives,
K = value of each question—with 50 questions, each valued 0.2 (in Brazil the maximum grade is ten points).

In the practical examination, an adequate number of microscopes greatly facilitates the progress of the examination. In our laboratory, we use 60 microscopes in the practical tests. In our experience, however, satisfactory results can be obtained with twenty microscopes, although the execution of the test is more difficult, since it requires the division of the class. For example, a class of 60 students must be divided into three groups.

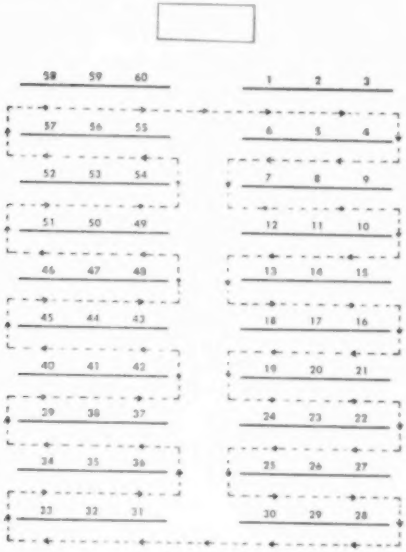

Chart 1.—Disposition of microscopes for the practical examination. The dotted line indicates the direction in which the students move. Note that the microscopes were arranged to avoid intercrossing movements.

There are, in our course of histology, 60 registered first-year students who were accepted on the basis of aptitude tests. This represents for us an ideal number, since it corresponds to the number of microscopes available and makes it possible to examine the whole class at one time.

The microscopes are arranged, numbered, and placed on the tables so that the last number (60) remains by the side of the first (1) (Chart 1).

In each microscope there is in focus either a particular structure (indicated by the painted arrow) or organ (no arrow). For example: microscope number 1 has in focus

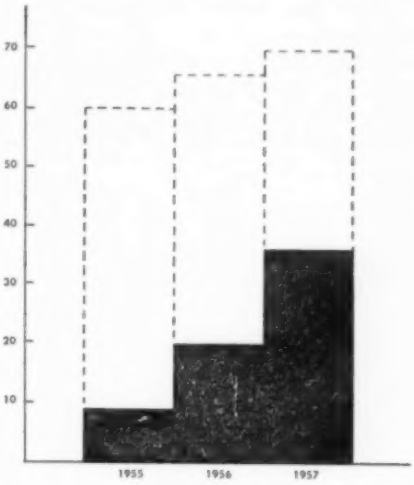

Chart 2.—┌┐: Total number of students. ■ Approved by *media*. 1955—9 approved by media in 60 = 15.0 per cent; 1956—20 approved by media in 66 = 30.3 per cent; 1957—36 approved by media in 70 = 51.0 per cent.

a section of the spleen. The question then would be:

Question 1.—There is in focus:
a) lymphatic node
b) Peyer's plate
c) spleen
d) lymphatic infiltration

In the case of a particular structure of the spleen, the question would be:

Question 1.—The arrow indicates on this section of the spleen:
a) penicillar artery
b) pulp cord
c) sinusoid
d) vein

On entering the room, each student is placed in front of a microscope. They are

first given instructions and alerted as to which microscopes have arrows, since it is not possible to move the stage of these; only the focus can be adjusted, since, otherwise they might move to a field other than that indicated by the arrow. However, slides on the microscopes without arrows may be moved.

They then receive the mimeographed sheets with the questions and four alternative answers. These questions are numbered from one to 60, and the student begins the test by answering the question that corresponds to the number of the microscope in front of him.

After a given time (1 minute) a bell rings and the student passes immediately to the microscope with the next higher number (from 4 to 5; 10 to 11; 60 to 1; etc.).

In 60 minutes, each student has viewed all the slides on all the microscopes and underlined what he considers to be the correct answer for each. The tests are then corrected in much the same manner as the theoretical examinations.

The efficiency of this method of evaluation is indisputable for several reasons: (*a*) it is impossible by ordinary methods to test 60 students on 60 questions each in only one hour; (*b*) the examination is equal for all with respect to quality and difficulty; (*c*) allowing the student to correct his own examination gives him a sense of responsibility; and (*d*) there is complete elimination of discontent over marks given by the old methods of evaluation knowledge.

The students in our course have accepted this method of testing completely. The results, as verified by the index of those approved by *media* in the years 1955–1957, are improving every year.

It should be pointed out that in Brazil, on the basis of laws now in effect, a student with a final grade of seven or above is considered *approved by media*.

Medical Education in Canada in 1959

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Canada, with a population of 17 million, is a vast country in which the great majority of the people live close to the southern boundary and in which the center of population is in the lower Great Lakes and upper St. Lawrence River region. The breadth of Canada, from Newfoundland in the east to Vancouver Island in the west, is about 3500 air miles, and distributed over this distance are twelve medical colleges all of which are integral parts of larger universities. One college is found in the maritime provinces (Dalhousie), seven are located in central Canada (Laval University, McGill University, University of Montreal, University of Ottawa, Queen's University, University of Toronto, and University of Western Ontario), while there are four Faculties of Medicine in western Canada (Universities of Manitoba, Saskatchewan, Alberta, and British Columbia).

The first graduate of a still existent Canadian medical school was Mr. W. Logie, who graduated from McGill in 1833 (1). Since that time the number of graduates has steadily increased until at present between 900 and 950 students are graduated each year (7).

All these schools are affiliate institutional members of the Association of American Medical Colleges, and it is no exaggeration to state that these twelve between them save the United States taxpayer the equivalent of the initial cost and upkeep of at least one medical college, since it is estimated (7) that up to 25 per cent of our graduates in any one year eventually go to the United States. Thus, perhaps 200 Canadian M.D.'s will go to the United States each year. This exodus is a cause of concern to Canadians.

A quick perusal of the recent catalogues of nineteen American Medical Colleges that list the university of graduation of their staff members, and that are well scattered throughout the United States, indicates that, on the average, there are nine graduates of Canadian schools on the faculty of any one college. The lowest number found was one, and the highest 32. Extrapolating for the total of 85 American colleges it would appear that Canadian medical education has supplied medical education in the United States with between 750 and 800 graduates of sufficiently high caliber that they have found places on existing faculties of American institutions. It is of further interest to note that about one half of these are graduates of McGill University.

All twelve Canadian Colleges are now granting M.D. degrees, with the last 2-year school (Saskatchewan) changing to a 4-year school in 1955 and graduating its first M.D. in 1957. All schools appear to feel that their objective is to graduate physicians who, with further suitable training, can enter any field of medicine but who, in most faculties, at the time of graduation, need a junior internship before licensure. (At least two schools have 5-year programs with the last year an undergraduate intern year.)

ADMISSION PRACTICES

For many years almost anyone with the satisfactory prerequisite courses could easily find a place in one of the Canadian medical colleges, but the situation later changed until there were far too many qualified applicants for the available places in the fresh-

* Secretary, Association of Canadian Medical Colleges.

man class of each of the medical faculties. This problem became most acute following World War II, and has since eased considerably. It is now possible for almost any suitably qualified applicant to obtain acceptance in some Canadian school. By "suitably qualified" is meant a candidate who has not only obtained the necessary prerequisite courses and years of university but who has also obtained a sufficiently high academic average to insure him of a reasonable chance of success in medical school. This average is roughly equivalent to a 2.5 to 3.0 grade point average in U.S.A. terms.

Almost all candidates must undergo a personal interview with a representative of the Admissions Committee of the faculty concerned, and in many cases he will have to take the Medical College Admissions Test, developed in the United States by the Educational Testing Service.

When all the accumulated data on each applicant is considered, available places are offered to those who seem to have the best chance of success in medicine, both as undergraduates and as graduates.

The prerequisite courses will vary from university to university, although most faculties admit students who are still a year short of obtaining their Bachelor of Science degree. However, certain colleges, notably Toronto and Queen's, admit students with only senior matriculation into a "premedical" course that is directly under the jurisdiction of the medical faculty. Students thus accepted are assured of places in the medical course if their performances are satisfactory.

Students who desire to take their training in French may do so at either the University of Montreal or Laval University. The University of Ottawa can perhaps best be described as bilingual, with students of both cultures (English-Canadian and French-Canadian) learning side by side, but writing examinations in English. The French-Canadian population from which these universities draw their students numbers about 4.7 million (9).

STANDARDS

It is always difficult to compare standards of one country with those of another, but the knowledge of Canadian graduates seems to be on a par with that of graduates of United States schools. Our graduates fare at least as well on National Board and other examinations in the United States as do graduates of American schools (7).

Graduates of all Canadian Medical Colleges are eligible to take the examinations of the Medical Council of Canada, and, in fact, many colleges use these examinations as their own final examinations, thus having "conjoint examinations" and saving the students the writing of two sets of examinations in their final year. The Medical Council of Canada is a statutory body set up by Act of Parliament in 1911 and recognized by all provincial licensing bodies. Thus a person who completes his Medical Council of Canada examinations is eligible for licensure in any province in Canada when he has successfully served a year's junior rotating internship. These examinations provide a form of "quality control," and by them each college is able to judge the performance of its students when compared with nation-wide standards. It may be added that most candidates who are permitted by their faculties to sit these examinations pass them without undue difficulty, and while occasional candidates from each university manage to fail individual examinations complete failure is rare for a graduate of a Canadian medical college. Perhaps two or three failures in individual examinations per college per year is the average rate for Canadian graduates attempting these examinations.

Students at French-Canadian universities may take the Medical Council examinations in French with the Council endeavoring to keep the standards of the two examinations as nearly alike as possible. This helps to insure similarity in the curricula and standards of the two groups of universities.

FINANCIAL SUPPORT

The financial support of the Canadian universities in which there are medical facul-

ties is primarily, with certain exceptions, from governmental bodies. Certain of the schools are private institutions, but they too receive considerable government assistance. The typical school is one which is financed primarily by the government of the province in which it is located. Occasionally the city or even the nearby municipalities may assist. Recently all universities in Canada that will accept it have received a grant from the federal government. (In Canada education is a provincial matter, and sometimes this right is very jealously guarded.) The amount of this "federal aid" is determined by the population served by the university and now amounts to $1.50 per year per person of that population. It is accepted by all but three of the universities which have faculties of medicine.

Commercial support of medical education in Canada is very limited and almost entirely confined to matters of research.

Student fees play an important role in the support of faculties of medicine, but do not even approximately cover the whole cost. These fees vary considerably from college to college within a range of from about $450 to $750 per student per year. (In this connection it might be mentioned that the Canadian dollar is currently at a slight premium over the American dollar.) Most schools report only limited financial aid for their students, with the bulk of this coming from loan funds which are usually government-supported. In general the fees are unchanged by place of residence, although two schools report higher fees for non-residents.

Our students usually must work during their summer vacations to earn some income to help with their expenses in medical school, but this source is usually insufficient to meet their needs. Help from parents, wives, or relatives is almost invariably needed, but even if this is forthcoming about two-thirds of our students will be in debt by the time they graduate (8).

CURRICULUM

The curriculum is basically the same in all Canadian medical colleges, although small differences between schools make it difficult for a student to transfer from one faculty to another. Similarly, students transferring from other countries have considerably difficulty fitting into our timetables, and such transfers, with advanced standing, are rare.

The curriculum in Canada may appear, to many apostles of experimental curricula, to be very stodgy and "middle-of-the-road." Our curricula do change, and often this change is thorough, but extremes are generally avoided and only proved methods accepted. Sweeping integration of courses is largely unknown, although moderate degrees are accepted and greeted with varying amounts of tolerance. This does not imply a lack of interest in experiments in medical education but rather a hesitancy to accept what is new just because it is new, and a desire to wait until a new approach is proved to be valuable or else has been discarded. The medical colleges and their curricula meet the standards of the Association of American Medical Colleges; otherwise the schools could not continue as affiliate institutional members.

Primarily the curricula cover normal structure and function in the first year, and introduce abnormal structure and function with some patient contact in the second year. Clerkships in the third and fourth years are now the general rule, with varying degrees of integration in didactic exercises, but with the clinical subjects maintaining their individual identities on the wards. Each of the foregoing "years" is about 33 weeks long, exclusive of examinations and holidays.

STAFF

Teachers in Canada are recruited from both medical and non-medical graduates. The non-medical ones are found most frequently in departments of Biochemistry, Physiology, and Pharmacology, and it is not unusual for the full-time staff of such departments to be composed completely, or almost completely, of non-medical graduates. However, in these cases there are usually part-

time members of the staff who are medically trained and are thus able to provide correlation of these sciences with the clinical subjects. At the same time the basic science departments generally take part in teaching in the clinical years and this again provides liaison between the different disciplines.

In departments of Anatomy, Pathology, and Bacteriology it is unusual for the majority of the staff to be non-medical graduates, and again many of the part-time members are practicing clinicians who bring the practical aspects of these disciplines to the attention of the students.

In the clinical departments there is an increasing trend toward so-called "geographic full-time," and occasionally true full-time, appointments. (By geographic full-time is meant an appointment which provides a basic salary to the person concerned with additional income allowed from a limited consulting practice.) While these may be viewed with suspicion by the established practitioner, the need for such appointments is indisputable when one remembers that lecture presentations are greatly reduced and much small group and seminar type teaching is necessary. In spite of these appointments most Canadian universities find they depend more than ever upon part-time clinical teachers to aid the students in their pursuit of the art and science of medicine.

To an increasing extent residents in the teaching hospitals take part in the teaching programs and discuss histories with the students and aid them in becoming adept at physical examination. Thus the universities find that to maintain an adequate undergraduate teaching program they must also have a strong graduate program.

EFFECT OF HOSPITAL INSURANCE

In recent years there has been a major trend in Canada toward universal hospitalization, with most provinces now cooperating with the federal government in sharing the costs of such plans. Considerable concern is expressed in areas where most teaching has been done on public ward patients that this change may seriously interfere with both graduate and undergraduate teaching. At present no final solution has been found for this problem in these areas.

However, there are other areas in Canada where the indigent population is small and where the teaching of medical students is, and has been, dependent upon the cooperation of private patients. Schools in these areas report no major problems in obtaining adequate clinical material, and by and large patient cooperation is excellent. Very few objections are raised to one doctor teaching on another's private patients, and students do not suffer from a lack of interesting and instructive material. In some faculties this arrangement is informal and is simply understood by all concerned. In another all patients on entering the major teaching hospital sign a form indicating their willingness to take part in the teaching program (4). Both programs work well, and their continued success is due to the cooperation and understanding of all concerned: students, staff, and patients.

Outpatient departments provide an important site for teaching on ambulatory patients, but in areas of low indigent population the obtaining of patients may be a problem. A trend is gradually becoming established to have non-indigent patients receive examination and treatment in outpatient departments in order that our students may see the types of cases most frequently seen in a doctor's office. With the advent of universal hospital insurance it may be that outpatient services will be covered (except for physicians' fees), and already at least one province has announced support for this policy. It is likely that this trend may help schools secure more outpatients in their teaching areas.

GRADUATE TRAINING

The training of graduate students is now a very important facet of Canadian medicine. Only a few years ago almost all graduate education in the specialties, in Canada, was centered in Toronto and Montreal. Now all schools have thriving graduate programs,

not only in the clinical fields, but in the basic sciences as well.

In anatomy, physiology, pharmacology, bacteriology, and biochemistry the training is primarily in research and usually leads to a Master's or Doctor's degree in the subject studied. Usually the Faculty of Graduate Studies of the University concerned must approve the program of each candidate. Many graduate students in these subjects are not graduates in Medicine but rather graduates in Arts and Science who seek further work in a field related to medicine.

Other graduate training programs are available in such fields as public health and hospital administration.

Certain universities (e.g., Toronto) give an M.Sc. for graduate work in one of the clinical specialties, but usually such graduate training is directed toward the certification or fellowship examinations of the Royal College of Physicians and Surgeons of Canada.

The certification examinations of the Royal College are taken after a recognized period of graduate training and are comparable to the specialty board examinations in the United States. They are recognized by all the provincial licensing bodies, except in Quebec, so that holders of certification may advertise themselves as specialists and set their fees accordingly. Fellowship in the Royal College is based upon a high standard of examination performance after a specified period of training (usually 4 years after junior internship) approved by the college.

The Royal College of Physicians and Surgeons of Canada was established by Royal Charter in 1929 primarily to improve standards of specialist practice in Canada, and fellowship is open only to those who meet rigid requirements of training and examination. During World War II, at the request of the Canadian Medical Association, the College commenced the certification of specialists who had proved competency in their own fields but who were not fellows of the college. This means that the Royal College is a very important body in the maintenance of high standards of medical practice in Canada.

CONTINUING MEDICAL EDUCATION

Recently the College of General Practice was set up in Canada with the purpose of improving the level of general practice. Members of this college must meet certain specified standards and, perhaps even more important, must take time each year to further their knowledge by attendance at various courses given, usually by faculties of medicine, to acquaint practitioners with the latest developments in various branches of medicine. Such programs of "Continuing Medical Education" are country-wide and are based primarily on many short courses, of from 1 to 6 days' duration, on almost any topic or topics related to medical practice.

Besides this all large centers have "Academies" of Medicine where regular meetings acquaint members with the latest advances in medicine. Practitioners in areas where no such academies exist usually belong to district medical societies which endeavor to maintain high standards and are often visited by teams of specialists from nearby faculties who conduct lectures, panels, and clinics for the benefit of the members of the local society.

In Canada with its scattered population in a very large area it is often difficult for practitioners to find centers of "Continuing Medical Education" close enough to their homes to make use of either of the types of training mentioned. These practitioners, then, usually leave their practices for a variable period and travel to centers where more extensive refresher-type courses are given.

MEDICAL RESEARCH

Inseparably linked with medical education in Canada is the closely allied subject of medical research. Unlike some countries where much fundamental research may be done in central laboratories the great majority of medical research in Canada is carried out in the medical colleges, with only specialized research, as in public health or mili-

tary medicine, being conducted in government laboratories.

Canadian medical research has produced many important findings, both fundamental and practical. The discovery of insulin by Banting and Best in the early 1920's made Canadians realize that even countries with small populations and limited facilities could conduct important research, and this stimulated many later noteworthy discoveries. For example, Collip isolated parathyroid hormone; Johns developed the cobalt therapy unit; Selye propounded his "stress" theory; Pablum was produced at the University of Toronto; Barr first identified sex chromatin; the "Franks Flying Suit," developed in World War II, is the forerunner of all anti-gravity suits so important in jet aircraft. These are but a few of the more spectacular results of Canadian medical research, and all were developed, either in whole or in part, in a University Medical Faculty. Projects currently under study are so varied that enumeration is impossible.

The Universities, then, not only wish to provide research facilities and stimulating environment to attract good men to their staffs, but also must solve, or help to solve, many pressing medical problems, since other facilities for such research are not available in Canada. This does mean, however, that government funds which might go to a central research laboratory are instead distributed to the universities and, therefore, used to support research in their medical faculties.

Ballard (2) indicates that governmental aid to all research in Canada is free from the influence of changing political views and yet effective control is maintained to insure high quality of research for which grants are given. This applies to all government-supported research and is certainly true for medical research. Ettinger (3) in 1958 estimated that somewhat over $5,535,000 was available to medical research from government sources, while total funds available to medical research (grants-in-aid, fellowships, etc.) from all sources in 1955–56 was estimated by Layton to exceed $9,000,000 (5). These funds go largely to the universities.

The main distributing agency is the National Research Council of Canada, which in 1959 has just less than two million dollars to distribute for medical research (6). This assistance is given in the form of grants-in-aid and fellowships and is, in general, used to support those projects for which funds are not available from other sources. This portion of the National Research Council's activities is now considered to be so important that the chairman of the medical committee is a vice-president of the whole council.

Other strictly governmental agencies that aid medical research are the Department of Health and Welfare (funds available in 1955–56, $1,785,000, according to Layton) and the Defense Research Board. Both of these organizations have their own laboratories where much of their research is done, but they also provide grants-in-aid to the universities for research projects that are in their sphere of interest.

The National Cancer Institute receives some assistance from matched federal and provincial grants, but the great majority of its funds come to it from the Canadian Cancer Society, which in turn depends on the provincial cancer societies for local campaigns to raise money from the public. This is just one example of how Canadian public and government funds can be pooled to provide support for research, in one disease, without overlapping of effort, since only one agency distributes the funds.

Besides making possible grants-in-aid and fellowships, the National Cancer Institute has recently joined with appropriate provincial cancer societies to provide well equipped and staffed cancer research laboratories in some Canadian universities.

Some United States agencies make funds available to Canadian research scientists, but relatively speaking support from this source is limited.

Private companies also provide funds for research, but these are usually for specific problems related to the interests of the com-

pany concerned. Here too American funds may aid Canadian research.

No discussion such as this could be complete without mentioning the John and Mary Markle Foundation which supports medical scholars in Canada on the same basis as it does in the United States. Each scholarship is worth $30,000 over a 5-year period and provides outstanding young medical scholars with the stimulus to make teaching and research their lifetime careers. In any one year there are usually from one to three such scholarships awarded to Canadians, to work in Canadian universities.

ASSOCIATION OF CANADIAN MEDICAL COLLEGES

Canadian medical schools, faced by the problems of World War II, created, in 1943, their own organization, which is known as the Association of Canadian Medical Colleges. This Association holds annual meetings, and occasional special ones when situations appear to warrant this course of action. This body, with a membership of only twelve faculties, is much more intimate than the sister organization in the United States. The deans know each other well and are able to discuss mutual problems in an informal atmosphere which can often make an individual school realize that its problems are not unique and that other schools, in many cases, have already met and solved them.

Notwithstanding this valuable informality the Association enjoys the prestige of being able to speak for Canadian medical education, since it is the only body to represent this sector of medicine in Canada. Liaison with organized medicine in Canada is maintained by representation of the Association on the Canadian Medical Association. Since many of the deans are Fellows of the Royal College of Physicians and Surgeons of Canada, liaison with that organization is also good.

At all regular meetings of the Association of Canadian Medical Colleges representatives of the Association of American Medical Colleges and the Council on Medical Education and Hospitals of the American Medical Association are invited to act as observers and to join in the discussions. This, together with the fact that many Canadian deans regularly attend meetings of the Association of American Medical Colleges, makes for excellent liaison between the two organizations and permits the exchange of information of common interest to the two countries.

SUMMARY

Canadian medical education in 1959 appears able to provide for the needs of this country in the production of both basically trained practitioners and specialists in the many branches of medicine. It provides itself with the teachers and research scientists so necessary to its continuing growth and even has some left over to export to other countries. This exodus is a cause of concern to many Canadians who usually overlook the fact that, while the traffic may be largely one way, there is a definite influx into Canada of teachers and medical scientists trained in other countries. These help to bring the best from other countries to mix with the knowledge and techniques favored in this country, and the result is an enrichment of our own medical culture.

Medical education in Canada, as it results from all the influences and forces herein described, is composed of a fundamental portion of basic knowledge given by proved methods, plus enough of the new, and often unproved, material to make students aware of the changing picture in medicine. We endeavor to make our graduates versatile enough so that they can meet unexpected situations and new developments by drawing on a basic knowlege which we feel is fundamental to all medical practice. To concentrate entirely on what is new, or to explore very intensely only limited areas of medicine, at the expense of what is fundamental, is foreign to Canadian medical education. By retaining the teaching of basic sciences as entities in themselves we are sometimes

accused of being too conservative, but we refuse to be stampeded. When new methods are proved they are gladly accepted, but until we are convinced we prefer to carry on with what we know will work and will give us graduates who are so grounded in the art and science of medicine that they are not in danger of becoming technicians instead of physicians.

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Relationship between the Number of Doctors per Inhabitant and the Economic Development of Latin America

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RESUMEN

La América Latina en general, con excepción de Argentina, Uruguay y Cuba, tiene un agudo déficit de médicos y por ende de personal para-médico que dificulta su desarrollo económico y cultural.

La solución a este grave problema no está en el libre ingreso a las Escuelas Médicas existentes rompiendo la limitación de matrícula y selección de candidatos, sino en la dotación de un mayor número de Escuelas Médicas que, adecuadamente equipadas de personal e instrumental, puedan proporcionar un número creciente de profesionales que conpensen y aún sobrepasen el enorme crecimiento vegetativo de la población del continente.

La mayoría de los países de la América Latina está en condiciones económicas de sobrellevar los gastos que demanda la mantención de las Escuelas Médicas que necesita; pero no todos ellos están en condiciones de afrontar los gastos que demanden la construcción y dotación de nuevas Escuelas Médicas sin dañar otros planes de desarrollo de igual importancia, por ello es necesario que se recurra al crédito exterior y que este tipo de crédito sea considerado por las instituciones crediticias en igual forma que se considera el crédito solicitado para estimular la producción.

La formación del personal para-médico debe mirarse concriterio regional y en general debiera propender a disminuir los requisitos de ingreso con el objeto de aumentar su número, aún cuando se lesionara en parte su calidad.

El déficit de atención médica, que actualmente gravita con mayor peso sobre las zonas alejadas, podría solucionarse en buena parte con regimen de residencia obligatoria en hospitales generales que fueran foco de atracción al enfermo rural. Dicho sistema podría ser de mayor rendimiento que el de servicio médico obligatorio rural implantado por algunos países del continente.

The Latin American countries, while differing in geographical formation, climate, and ethnic origin of their inhabitants, have many problems in common. This is not surprising, since all these nations are at present in the middle of an economic development and are going through the same "Industrial Revolution" which Western Europe and the United States have experienced several decades ago.

The increasing industrial development which, differing only in degree, can now be witnessed in all Latin American countries, has brought about a hitherto unknown urban expansion; it also originated an intensive search for new sources of industrial power. This enterprise has not been entirely successful so far, since major production, except in a few instances, has still not attained sufficient capitalization for future economic development. However, there is already evidence of a wider and better distribution of wealth, as indicated by a considerable increase in population against a declining death rate. If actual conditions prevail it can now be predicted that, by the year 1980, the population of Latin America will surpass in number that of the Anglo-Saxon part of the Continent. According to estimates made by the World Health Organization, the population of North America will fluctuate in 1980 between 207 and 240 millions, while Latin America, at the same date, will count a total population of between 281 and 337 millions (2).

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In Latin America, production means are undergoing frequent changes, while the population is increasing rapidly. Therefore certain phenomena appear which do not bear comparison with those occurring in countries which initiated their industrial movement 150 years ago. In the past, the search for greater wealth and new food and power sources was undertaken by men who to a large extent ignored the comforts provided by the modern city and who never thought of the protection of human life that a medical service can offer. In those days, medicine was relatively inefficient, and its services were restricted to the economically privileged classes. Today medicine is considered an essential service. Therefore, the intensive settling and exploitation of those Latin American territories which constitute their reserve of wealth (destined to absorb the hitherto unknown increase in population) will not easily take place if the people are not assured of proper education for their children and adequate medical care for their families.

TABLE 1

NUMBER OF PHYSICIANS PER 10,000 INHABITANTS IN THE DIVERSE COUNTRIES OF LATIN AMERICA (1) (1957)

Country	No. physicians per 10,000 inhabitants
Argentina	12.8
Uruguay	11.6
Cuba	10.0
Venezuela	6.2
Chile	6.0
Mexico	5.7
Paraguay	5.2
Brazil	4.1
Costa Rica	3.7
Peru	3.7
Nicaragua	3.5
Colombia	3.4
Ecuador	3.4
Panama	3.1
Bolivia	2.6

The figures for the U.S. and Canada at the same date are 13 and 11.6, respectively.

Medicine has thus become a type of essential service which in a way collaborates in the production effort of man. Today, the question of medical care cannot be separated from labor and production problems, and we believe that modern medicine is a powerful fomenting factor without which economic growth would be greatly hampered.

One of the multiple problems which Latin American countries have in common today is a shortage of technicians and, above all, of doctors. If it is true that the latter are as essential a factor in the production process as engineers and technicians; and if economic development is today the foremost problem of Latin America, then an increase in the number of physicians is needed, and must be sought, not only for humanitarian but also for economical reasons.

Since the number of physicians and adequate medical care constitute a problem common to the majority of our nations (see Table 1), it seemed to us of interest to analyze the status of medicine in Chile, because what occurs here must also prevail in other Latin American countries and hamper progress to a similar extent.

The magnitude of the shortage of medical services reflected by the above figures can still be better appreciated if we take into consideration that a shortage of physicians is noted even in the U.S., in spite of that nation's having the highest rate in the whole continent.

Limiting our analysis now to the case of Chile we find a country with 7,200,000 inhabitants and six doctors for every 10,000. Population figures predicted for 1980 fluctuate between 8,550,000 and 9,300,000 (1) which means that 21 years from now the demand for medical care will have increased between 21.3 and 28.2 per cent.

Six doctors per 10,000 inhabitants is a figure sufficiently low to produce at present evident signs of shortage. Among them the following are considered the most severe:

1. The faulty distribution of doctors, with an almost total abandon of certain potential-

ly important areas and, consequently, their concentration in large cities. While in the areas surrounding Santiago (the capital city) and Valparaiso (the principal port) we find almost 11 doctors per 10,000 inhabitants, in the southern part of the country the rate does not even attain 2.5.

2. The lack of certain specialists essential for the population's proper medical care and the progress of medicine in Chile, such as pathologists, radiologists, ophthalmologists, laboratory clinicians, etc. Since specialization means 2 more years of study after graduation, these specialists can only be had in sufficient number in countries where the demand for medical service is not too pressing. In support of this statement we mention, for instance, one city in the north of the country which, with 100,000 inhabitants and being the medical center for a large area, has only one single ophthalmologist.

3. The lack of staff dedicated to teaching, especially the basic preclinical subject matters.

4. Deficient care for outpatients of the hospital services. This prevents the doctor from carrying out his role of educator and counselor of the patient; it also makes difficult—and almost non-existent—an affectionate relationship between clinican and patient and therefore helps maintain *curanderismo* [quacks and traditional healers] among the uneducated class of the population.

The Chilean Government, the universities, and, especially, the medical corps have been well aware of these consequences. It is due to their efforts that the country has at present three medical schools, two of which have been created during the last 30 years. Medical education, however, besides being very expensive, requires in addition the slow and careful training of teaching staff, and the desired effects cannot be produced until at least a decade after the opening of the first medical course (medical education in Chile comprises 7 years).

The public who suffers from the lack of doctors is unable to understand why the three existent medical schools maintain the system of selection and restriction of medical students, and pressure is being exerted to obtain unlimited admittance and enrolment. In a previous paper (4) we have shown, however, how selective entrance and restricted enrolment at the University of Chile have actually increased the number of physicians instead of diminishing it. Therefore, we are convinced that abolishment of the selective system—the pillar of our medical education—will not help to overcome the shortage but will greatly impair the quality of our graduates.

The increase in medical schools (from one in 1924 to three existent today) has not been sufficient to overcome the shortage, for the simple reason that the rapid increase in population has been greater than the increase in the number of physicians.

To analyze the trend the doctor-inhabitant rate is taking, we have studied the actual distribution of doctors by age and the annual number of medical graduates; the findings have then been applied to the probable death rate of the middle class population, according to estimates made in 1955 (3). Thus we established a yearly table which allowed us to examine what will happen in Chile if the yearly number of medical graduates is 250, and how an increase to 350 will affect the situation. If we compare these estimates with the predicted increase in population, the results are the following: With 250 graduates per annum, we would have in 1980 between 6.4 and 6.8 physicians, under 65 years of age, per 10,000 inhabitants. If the annual number of medical graduates had reached 350 by the year 1970, the rate would attain in 1980 figures fluctuating between 7.1 and 8.1, depending on whether the birth rate of our population diminishes or whether it keeps up its actual trend. A rate of 8.1 doctors per 10,000 inhabitants would already be sufficient to normalize the situation. There are countries today which at this rate, by means of good organization, have succeeded in establishing good medical care for their population, as, for instance, is the case in Sweden.

However, the medical shortage can only be overcome if from now on all the necessary measures are taken to produce by 1970 350 medical graduates per annum. This would mean the admittance of at least 400 medical students to first-year courses by the year 1963 (today, the three medical schools together admit a total of 290 first-year students). To carry out these measures, a good deal of financing is required, and the following steps are indicated:

1. To create conditions which will stimulate an increase of the teaching staff, especially in the preclinical subject matters. Preclinical instructors, however, should not expect the same salaries as clinical teachers, even if both teach full-time, because the full-time clinical instructor acquires professional experience and prestige which would allow him to retire to private practice at will (with a double or triple income), whereas the teacher of non-clinical disciplines depends on his teaching position (and the more specialized he is the more he is tied to it) and is unable, in general, to increase his income, especially in a country where universities are few.

2. To complete speedily the construction, by the University of Chile, of a building for the teaching of basic medical disciplines. It would be technically possible to finish it by 1961, but if special funds are not provided, construction could not be completed until 1967. If this building were ready, 200 first-year medical students could be admitted instead of the 150 which are actually allowed to enter.

3. Greater subsidies to private universities, particularly to the *Universidad Católica* which now admits only 38 medical students but could raise the number to 70.

4. Construction and operation of a medical school in Valparaiso, with a minimum enrolment of 50 students. Essential steps to carry out this project have been taken already, and the most important problem, that of gathering the teaching staff, seems also to be in the process of being solved.

There is no doubt that the country is well aware of the shortage problem and that measures for its solution are being taken. However, if resources are not multiplied, the slowness with which these measures are put into effect might well prevent the solution from coming about in time. Obviously, some day in the future we shall be able to admit the 400 first-year medical students; but if this figure has not been reached by 1963, it must be feared (because of the rapid increase of the population) that it will come too late to produce an acceptable doctor-inhabitant ratio.

Furthermore, the measures proposed to solve the problem mean greater expenses for teaching staff salaries (a relatively small quantity which could be absorbed by the budget), as well as greater investment costs (principally for constructions) which could not easily be absorbed in a short time by any Latin American country without the recourse to exterior credit.

A country in the middle of its economic development naturally has to face more than the one problem we have described: roads, ports, communications, industrial equipment, power sources, etc.—all these constitute more attractive investments, and exterior credits are generally exhausted by them, while their use for financing "Services," no matter how essential, seems not even to be considered. We believe such a policy to be erroneous, because we will never reach a stage of true progress without the recognition that the material development of a country must parallel that of the services essential to produce better men, which is, after all, the ultimate goal of progress. The attitude we prefer is precisely that taken by the Commonwealth of Puerto Rico, the benefits of which are already plainly visible in the major productivity of a people who did secure for themselves broad educational opportunity and adequate medical services.

The medical shortage suffered by Chile will be overcome only when it becomes plainly understood that modern medicine is on the same level of importance as other elements of production, and we do not believe that in this respect there are funda-

mental differences between Chile and the other Latin American countries.

Perhaps it will seem inconsistent that at first we denounced as a shortage the rate of six doctors per 10,000 inhabitants; that we stated, furthermore, that there are symptoms of shortage even in the United States with a rate of thirteen per 10,000, while, at the same time, we considered our problem as temporarily solved if we were able to attain a rate of eight per 10,000. However, there is no real contradiction, since it is obvious that the number of doctors existent in the United States could never be matched by us, just as we cannot expect to attain her rate of production per capita or her electrical power for industrial development. We must content ourselves with a rate of eight physicians per 10,000 inhabitants for the simple reason that a country like Sweden, so much more developed and wealthy than ours, is able to secure with that rate a medical service of high quality. Therefore it may be of interest to observe more closely the case of Sweden and to find out by what means that country has attained its high level of medical care. Actually, Sweden has 2.5 nurses for every doctor and auxiliaries for every nurse. Thus, the doctor is in a position to direct a well trained team able to assist him in his work, multiplying his efficiency. These facts demonstrate that the shortage of physicians is not the only factor responsible for a deficient medical service but that the shortage of medical auxiliaries must also be taken into consideration. This is not the place to discuss the problems of training and the importance of this type of personnel. The fact is that the smaller the number of doctors the greater the need to increase auxiliary staff, and, since our nations are not in a position to imitate the United States (where a nurse means professional help almost as costly as, for us, a doctor), they must find their own ways and means to train and develop hospital staff. If we had fewer requisites for the admittance to nursing careers, we could increase the number of schools and, in the end, that of professional hospital staff.

However, we cannot just wait for all these remedies to produce the desired results. Meanwhile, it is absolutely necessary to take some emergency measures in order to increase immediately the efficiency of the medical staff actually in service.

In our country, as, in general, in all Latin America, medical education is practically gratis. Therefore the principle could be established that every medical graduate undergo a 3-year period of residency in one of the country's general hospitals, according to his special interest. If put into effect, this measure would produce sufficient full-time medical staff for hospital services to function 24 hours the day, 8 of which should be dedicated to intensive medical labors including out-patient clinics (most of our hospitals are functioning now only 4 hours the day at an adequate pace).

We believe that a residency service in general hospitals such as suggested (which necessarily would have to be remunerated) would be an advantageous substitute for the so-called "rural medical service" established by some Latin American countries. The latter has the serious drawback that newly qualified doctors are sent into remote areas where they do not dispose of proper resources and equipment and cannot avail themselves of the counsel and guidance of their more experienced colleagues. Deficient medical service in rural areas is the consequence of the nation-wide shortage and will not be remedied by sending new medical graduates to places where they have no possibility of practicing high-quality medicine. A far better measure is the opening of roads which would permit rural patients to go to adequately equipped medical centers. Where few doctors exist it seems only logical to concentrate them where they are able to function scientifically, and to bring the patients to them.

If the proposed compulsory residency service were established, it would also stimulate the training in specialties which at present show the greatest shortage (in our

case radiology and pathology), because those wishing to specialize in these branches could initiate post-graduate training without being required to serve the compulsory residency period. The same exemption maybe applied to those who want to dedicate themselves to the teaching of pre-clinical subjects.

SUMMARY

Latin America, with the exception of Argentina, Uruguay, and Cuba, suffers today an acute shortage of doctors and auxiliary personnel which is hampering its economic and cultural growth. The solution of this serious problem does not lie in the abolishment of selective entrance and restricted enrolment of medical students but must be sought in the greater endowment and increased number of medical schools, which, adequately staffed and equipped, could produce an increased number of professionals sufficient to compensate—and even surpass —the enormous and rapid growth of population.

The economic conditions of most Latin American countries would allow expenses required for the maintenance of medical schools; but not all of them could absorb construction and endowment costs for new schools without harming other equally important development projects. Therefore exterior credits must be granted in the same way as those solicited for stimulating production.

In the training of para-medical staff regional criteria should prevail, and pre-requisites should be diminished to increase their number, even if their quality should be partly impaired.

The deficiencies of medical care, bearing at present most heavily on remote rural areas, could in part be remedied through a system of compulsory residency in general hospitals which then would become a medical center for rural patients. Such a system is believed to prove more productive than the compulsory "rural medical service" established by some Latin American countries.

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Medical Education in Denmark

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Danmarks 2 lægeskoler er knyttet til universiteterne i København og Århus, grundlagt 1479 og 1928. Adgangen til danske universiteter er åben for alle, der har bestået dansk studenter-examen,—efter 12 års skoleuddannelse, hvorunder der successivt finder en vis udvælgelse sted.

De 2 lægeskoler har samme studieordning, og undervisningen er gratis. Ca. 40% af studenterne opgiver studiet, særlig under studiets første år.

Studiet består af 2 dele. Den prækliniske 1. del er planlagt til at vare 2½–3 år, men adskillige studenter anvender længere tid. Undervisningen omfatter kemi, fysik, medicinsk statistik, anatomi, histologi, biokemi og fysiologi og afsluttes med en ret krævende examen.

Studiets 2. del, den kliniske del, er planlagt til at vare 4 år og gennemføres oftest på denne tid. Med henblik på fagenes koordination gives i hele perioden undervisning i medicin, kirurgi, pædiatri, patologisk anatomi, almindelig patologi og farmakologi, medens undervisningen i de øvrige discipliner gives i kortere eller længere perioder jævnsides hermed.

Den mere formelle undervisning er fortrinsvis samlet i 3 forårs- og 3 efterårsmåneder, medens der iøvrigt forrettes hospitalstjeneste—ialt i 18 måneder. I de første 6 måneder vejledes små studentergrupper af tutorer. Under studietiden er der en række mindre examiner i psykiatri, dermatologi, otologi og ophtalmologi, og studiet afsluttes med en omfattende examen i medicin og kirurgi (hver 3 examinationer), pædiatri, obstetrik, patologisk anatomi, almindelig patologi, farmakologi, hygiejne og retsmedicin.

Efter den afsluttende examen er der 1 års turnustjeneste i medicin og kirurgi, hvorefter der opnås jus practicandi.

Den postgraduate uddannelse som speciallæge er klinisk uden examination, men autorisationen gives af Indenrigsministeriet (Sundhedsstyrelsen) efter indstilling af specialistnævnet, hvori de videnskabelige selskaber er stærkt repræsenterede.

Denmark has two medical schools, both part of the two national universities, the University of Copenhagen and the University of Aarhus.

History.—In 1479 King Christian I founded the University of Copenhagen, planned as a *schola universalis* with four faculties for divinity, law, medicine, and philosophy; but some years after the foundation, religious strife and political unrest paralyzed the activities of the university. After the Protestant Reformation the university was re-established in 1537 by King Christian III. The first Head of the university was *doctor medicinae*, and the medical faculty had two professors who gave lectures 4 days a week, 2 days on mathematics and physics, based on the teaching of Euclid, Ptolemy, and Aristotle, and 2 days on medicine, based on the teaching of Hippocrates, Galen, Avicenna, and other classic authors. Further medical education had to be found abroad. In 1644 a *Domus Anatomica* was established, and the Danish anatomists, the Bartholins and Nicolaus Steno, became world-famous.

In the 18th century medical science in Denmark—as elsewhere—was influenced by the contest between *medici* and *chirurgi*. In 1736 a surgical school—independent of the university—*Theatrum Anatomico-Chirurgicum* was established, raised in 1785 to an *Academia Chirurgorum Regia*. Graduates from the academia were entitled to practice surgery as well as medicine. In 1769 a public examination was introduced at the university, extended in 1788 to a complete oral and written examination. From 1842 the Medical Faculty took over all medical and surgical teaching.

The first Danish Hospital with proper facilities for teaching was built in 1757. The present University Hospital of Copenhagen (Rigshospitalet) was built in 1910.

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The University of Copenhagen was for many years an independent institution, and had until 1771 its own jurisdiction, but many of the affairs of the university are now subject to the general legislation of the country, and only its internal organization is laid down by Royal decrees. The professors and other teachers are elected by the faculty and the university but formally appointed by the King or by the Ministry of Education.

The Head of the University of Copenhagen is the Rector, who is elected by the University Staff Assembly from among the professors. The treasurer (kurator), who is appointed by the King on the recommendation of the Ministry of Education, is in charge of the finances. Almost all the expenses are paid by the State. The students do not pay for tuition, apart from some symbolic registration and examination fees. The Head of the Medical Faculty is the Dean, elected for 1 year by and among the members (the professors) of the Medical Faculty.

The *University of Aarhus* was inaugurated in 1928. The Medical Faculty commenced its work by teaching a few subjects but quickly developed to be a complete medical school. The University of Aarhus was established as a private institution supported by the City of Aarhus, but by now the State defrays most of the expenses.

At both universities there are Student Representative Councils established by law. The members are elected by the matriculated undergraduates and represent the students externally and in negotiations with the university authorities.

The curriculum at the two medical schools of Copenhagen and Aarhus is now identical, apart from some minor details. The following presentation is based on the conditions at the Medical School of Copenhagen.

The pre-university teaching in Denmark.—In order to understand and be able to evaluate the curriculum of a medical school it is necessary to have some knowledge of the schooling prior to entering medical school.

Danish children go to school at the age of 6 or 7. During the first years they all go through fairly uniform classes; later they follow different lines.

The student who goes to the university will have passed through 5 years of elementary school and 4 years of middle school, from which he enters the senior university—preparing school, the "gymnasium," lasting 3 years.

The "gymnasium" is divided in two main lines, dominated by modern languages or science, respectively. A few schools still have a classical line, dominated by classical languages. The school year covers 40 weeks.

In Denmark there is no college system like the American. The student passes direct from gymnasium to university. During the "gymnasium" period most of the children live at home, a minor portion staying at boarding schools.

Before entering the middle school and especially before entering the "gymnasium" the children are fairly strictly selected, and in the "gymnasium" the pupils are screened by an annual examination before they are allowed to enter the next class.

Denmark has about 80 university-preparing schools, of which half are State schools, and most of the others are municipal. Only a few are private schools.

All the teachers of the "gymnasium" are university graduates, who have spent 6–7 years at the University of Copenhagen or Aarhus. The teaching and the examinations are very uniform. With minor variations the schools today follow a standard time table (Table 1).

The final examinations are partly written, partly oral. All university-preparing schools, State and private, answer the same papers on the same days, and the marks are given by external examiners. At the oral examinations the pupil is examined by his own teacher, and the marks are given by the teacher and an external examiner who attends the session.

In the near future a school reform will be introduced. All the children will attend the same school for 7 years, but after the 5th year there will be a screening for some of the

pupils to a special branch of the school, whose curriculum has a trend toward academic subjects (mathematics and languages). After a second screening (at the end of the 7th year), some pupils will go into a junior-examination school for 2 years, after which some (about 5 per cent of the original number of pupils) will be selected for the 3 years in the "gymnasium." The teaching in the "gymnasium" will cover the same subjects, to at least the same extent as previously.

The "open door" of the Danish university.—According to Danish law the university is open to everybody who has passed the final examination of the "gymnasium," and the student is free to choose what faculty he wants to enter. Consequently, there is no possibility for selecting students or limiting the number of students who want to enter medical school. A selection has taken place, however, before they passed the various steps of the university-preparing school, and especially during the studies in the "gymnasium."

There is a good correlation between the marks in the "gymnasium" and the performance of the students in medical school. After the students have entered medical school a further selection takes place. Many students leave medical school within the first year or two, even before appearing for any formal examination. Some fail to pass an early examination in chemistry, or later a rather strict examination in anatomy, physiology, and biochemistry.

Only 65 per cent of the male students and 40 per cent of the female students complete the pre-clinical years of the curriculum. After this selection very few fail to go

TABLE 1

THE UNIVERSITY-PREPARING SCHOOL STANDARD TIME TABLE

(hours/week)

For the Danish Grammar School, consisting of a 4-year junior department ("middle school")—age group 11/12–15/16—and a 3-year senior department ("gymnasium")—age group 15/16–18/19, which is divided into two main lines, "modern languages" and "science line."

	MIDDLE SCHOOL				GYMNASIUM					
					Modern language line			Science line		
CLASS	1	2	3	4	I	II	III	I	II	III
Religious knowledge	2	2	2	1	1	1	1	1	1	1
Danish	5	4	4	5	4	4	4	4	4	4
History	3	2	3	2	3	3	4	3	3	4
Ancient literature and art					1	1	1	1	1	1
English	6	3	3	3	5	6	5	2	2	
German		5	4	4	5	4	4			
French					5	5	4	5	5	4
Latin				4*	4	4	3			
Geography	2	2	2	2						
Nature study (mostly zoology & botany)	2	2	2	2						
General Science†					2	2	4	2	2	4
Physics (and chemistry)	2	2	2	2				6	6	6
Mathematics	4	5	6	7				6	6	6
Physical education	4	4	4	4	4	4	4	4	4	4
Writing (penmanship)	2	1	1	1						
Drawing	2	2	1	1						
Singing (and music)	2	2	2		2	2	2	2	2	2
	36	36	36	38	36	36	36	36	36	36

* Obligatory only for those pupils who are candidates for the language line of the "gymnasium."

† This subject includes biology, physiology, geography, astronomy, and—for the language line—some elements of physics.

through the clinical years of the curriculum and the final examination.

This system involves a waste of time for the student who fails and a waste of time and work for the teachers, but so far it has not been possible for the Medical Faculty to be allowed to introduce a selection system for students entering the medical school. On the other hand, the students who are admitted have been selected to some extent during their passage through the university-preparing school, and the further selection in medical school is made on the basis of their performance in the basic disciplines of medicine.

Foreigners as a rule are not admitted to medical school, except for short periods.

Students who have not passed the science line of the "gymnasium" will have to take supplementary courses in chemistry, physics and mathematics during their first 6 months to 1 year in medical school. Students from the science line who have not had Latin must pass a supplementary test in this subject.

Apart from this, the curriculum is uniform for all students, consisting of 2½–3 pre-clinical years and 4 clinical years, ending with the final examination (Table 2). After this period there is one year of compulsory internship.

TABLE 2

THE CURRICULUM OF THE MEDICAL SCHOOL OF COPENHAGEN

	Distribution of hours				
Disciplines	Lectures	Seminars	Laboratory work, techniques, etc.	Clinical clerkships	Total
Anatomy including histology	72	504	181		757
Physiology	60	88	52		200
Biochemistry	96	90	48		234
General chemistry	72	106	72		250
Physics	36				36
Medical Statistics	12	24			36
Internal medicine	264	168	14	688	1134
Surgery	348	156		688	1192
Pediatrics	72	72		125	269
Obstetrics & gynecology	60	48	48	200	356
Pathological anatomy	92	96	36		224
General pathology including bacteriology	60		40		100
Pharmacology	84	24			108
Psychiatry	60			150	210
Neurology	36			100	136
Dermatology	12	24		50	86
Epidemiology	12			50	62
Ophthalmology	24	36			60
Otology	24	36	6		66
Orthopedic surgery	24				24
Physical medicine	12				12
Hygiene	84		16		100
Forensic medicine	72				72
Radiology	36	32			68
Anesthesiology	24				24
Clinical chemistry			12		12
Genetics	12				12
Total	1760	1504	525	2051	5840

The pre-clinical years of the medical school (part I).—Like all other students at the university the medical students, in the first year, have to follow a traditional course in philosophy. Besides this the teaching during the first year is concentrated on anatomy, physics, chemistry, and medical statistics, and the students have to pass an examination in chemistry and a test in medical sta-

tistics (all students) and physics (students of the languages line).

The next 1½–2 years are occupied by anatomy, histology, physiology, and biochemistry. Most of the teaching is given by instructors to small groups of students, through laboratory work in physiology, biochemistry, and anatomy (dissection courses) and to some degree through lectures.

The formal teaching covers 4–6 hours a day during 8–10 months per year, and the students are supposed to spend an equal amount of hours on home work.

At the end of the preclinical years the students have to pass a fairly difficult examination, with two sessions in anatomy (including histology) and a written plus an oral examination in both physiology and biochemistry. The students are examined by the professor or a lecturer (associate professor), but two external examiners attend the session, and the marks are given by the teacher and the external examiners, who all have equal votes.

The external examiners—for all the various disciplines—are selected by a committee with one faculty member, two doctors who have previously been external examiners, and two doctors selected by the Medical Society of Copenhagen.

About one third of the students who appear for this examination do not pass the first time but are allowed within certain limits to appear 3 times for the examination. They have to pass all the examinations in anatomy, biochemistry, and physiology in one term.

The examinations are held twice a year. The students spend, on an average, 3½–4 years on the preclinical disciplines.

The clinical year of the medical school (part II).—The curriculum of the clinical part of the medical school covers 4 years. Until recently this was divided into two parts, each terminating with a number of examinations. The period is now undivided, with a comprehensive final examination and some minor tests.

The basic idea is that the various disciplines supplement and support one another and that it is of great importance that the teaching of the various disciplines is coordinated in time.

Internal medicine, surgery, pediatrics, pathologic anatomy, general pathology, and pharmacology are therefore taught throughout the 4 years, whereas the teaching in some disciplines: psychiatry, neurology, ophthalmology, otology, dermatology, etc., is given over a longer or shorter period within the 4 clinical years.

Much stress has been laid on clinical clerkships in various disciplines, for which reason the more formal teaching is concentrated in two periods (so-called semesters), running from September 1st to December 1st, and from February 1st to May 1st. The intervals are almost completely occupied by clinical clerkships, leaving only vacation periods of 1–2 months a year.

The students are not strictly divided in classes in a formal sense. They are free to follow or not follow some parts of the formal teaching, whereas other parts—some of the clinical courses, all the laboratory courses, and the clinical clerkships—are compulsory. The students must keep to the chronological order of the various compulsory components of the curriculum but may to some degree extend their studies over a longer period than planned in the curriculum. Most of the students, however, go through in 4 years; some take a little longer time; very few are capable of going through in 3½ years.

During the first 6 months after having passed the pre-clinical examination the students have their first clinical clerkships (3 months of internal medicine, 3 months of surgery). Later on they have clerkships for 3 months in medicine (with 1 month in an outpatient clinic), 3 months in surgery (with 1 month in an outpatient clinic), 1 month in psychiatry, 1 month in neurology, 1 month in pediatrics, 1 month in obstetrics and gynecology, and minor periods in dermatology and epidemiology.

During their first clinical clerkships the students are divided into groups of ten, each group having a tutor who is a staff member of a medical department and an instructor

who is a staff member of a surgical department.

Under guidance of these tutors and instructors the students work in the department every morning from 8 A.M. to 12 A.M. 6 days a week and may—if they wish to—take part in the work also outside this time. The medical and surgical instructors will twice a week for 1 hour give more formal teaching to their group of ten, and, in addition to this, the medical instructor will give a course in physical examination, stethoscopy, etc., to small groups of three to four students, arrange courses in basic clinical laboratory work, and in collaboration with the nursing school give some basic training in the techniques of nursing.

In the afternoon the students attend some lectures in medical psychology, social medicine, elementary surgery, anesthesiology, and pathologic anatomy for 1 or 2 hours.

About half of the medical students perform this first clinical clerkship in the university hospital, a little more than half are in affiliated municipal hospitals, but the teaching is given along the same lines.

It is the task of the tutor to teach and educate the students, to underline the basic principles and methods, to develop the ability of observation and the critical evaluation of facts and theories.

After this basic introduction the later 3½ years of the curriculum is divided in seven semesters.

Throughout the whole period the students have the opportunity to attend lectures in internal medicine (3 hours a week), surgery (3 hours a week), pediatrics (1 hour a week), pathologic anatomy (1 hour a week), general pathology including bacteriology and serology (1 hour a week), pharmacology (1 hour a week), clinical pathological conference (twice a month). Some of the lectures are substituted by panel discussions.

This teaching is given by senior faculty members, and besides this "nucleus" there will, in the various semesters, be given special teaching in these and other disciplines.

In the *second semester* the students—besides the above-mentioned continuous teaching—follow special courses in medicine (3 hours a week), surgery (3 hours a week), and pediatrics (3 hours a week). These courses are given to groups of fifteen students by associate professors in affiliated municipal hospitals. The teaching methods may vary somewhat, but the students are induced to be active participants. Generally a student will take the history, examine a patient before the session, and present and discuss the case with the teacher and the group. Besides this the semester will contain a course in psychiatry (2 hours a week), radiology (3 hours a week), bacteriology, and blood-bank work.

In the interval between second and third semester the students spend a month of clinical clerkship in a psychiatric department.

In the *third semester* the students will continue to follow the "nucleus" of teaching as outlined previously, and receive additional teaching in psychiatry (2 hours a week), neurology (3 hours a week), epidemiology (1 hour a week), dermatology and venereology (3 hours a week), orthopedic surgery (2 hours a week), courses in histopathology (2 hours a week), and some additional teaching in medicine and surgery. The teaching in these and the following special courses is given in various ways—lectures, demonstrations, discussions.

At the *end of the third semester* the students have to pass an examination in dermatology, and before the beginning of the 4th semester a written examination in psychiatry.

The 3 months of the *4th semester* and the following 2 months are occupied by clinical clerkships in pediatrics (1 month), neurology (1 month), medicine (1 month in an outpatient clinic), surgery (1 month in an outpatient clinic), and shorter periods in epidemiologic and dermatologic departments.

In the *5th semester* the additional teaching (besides the "nucleus") will consist mainly of courses in opthalmology (5 hours per week) and otology (5 hours per week), ending with examinations, and special

courses in pathologic anatomy, genetics, and physical medicine.

In the *6th and 7th semesters* the additional teaching mainly consists of courses in obstetrics and gynecology (7 hours weekly), hygiene and social medicine (3 hours a week), forensic medicine (3 hours a week), and some special teaching in medicine, surgery, pathologic anatomy, pharmacology, and anesthesiology.

At *the end of the 7th semester* a written examination in hygiene and social medicine is passed.

In the intervals between the various semesters the remaining clinical clerkships are performed in medicine (2 months), surgery (2 months), obstetrics (1 month). These parts of the medical and surgical clerkships may be performed in a number of hospitals besides the University Hospital and the affiliated hospitals—and even in some hospitals in other countries, especially Norway and Sweden.

Quite often it is possible for the students to obtain a paid job in some of the hospitals during the summer vacation.

In one of the summer intervals the male students are drafted for 2½ months' basic training of the Army Medical Corps. The remaining military service is performed after the final examination.

In the *8th semester* the "nucleus" of the teaching will continue, but there is some additional teaching in medicine (3 hours a week), surgery (3 hours a week), pediatrics (3 hours a week), and some short refresher courses in various disciplines.

The students now prepare for the final examination which will extend over two months.

The final examinations.—The students are examined 3 times in medicine (written, oral, and clinical examination), 3 times in surgery (as in medicine), and once in each of the following disciplines: general pathology, pathologic anatomy, pharmacology, obstetrics, pediatrics, and forensic medicine.

The student is examined by the professor or a lecturer (associate professor). The professors of neurology and epidemiology, orthopedics, and neurosurgery take part to some extent in the examinations in medicine and surgery. Two external examiners attend the session, and the marks are given by the teacher and the external examiners, who have equal votes.

After having gone through the whole curriculum very few students fail to pass the final examinations. It is possible within certain time limits to appear 3 times for the examination. The examination in hygiene may be taken separately, but the examinations in all other disciplines have to be taken in one term. Examinations are held twice a year.

Almost all the students go through the clinical part of the curriculum in 4 years, so that the total time in the medical school is 7½–8 years on an average. Very few go through in less than 7 years.

The marks at the medical examination.—At the medical examination a total of eighteen groups of marks are given, i.e., five at the pre-clinical examination (part I) and thirteen at the clinical examination (part II). The marking scale includes the numerical values from +16 to −22. To pass part I, a total mark of at least 40 is required.

Successful candidates are grouped in the following four classes according to the total number of marks obtained in parts I and II: *Laudabilis et quidem egregie*, for which is required a total mark of at least $18 \times 14\frac{1}{2} = 261$; *laudabilis*, for which is required a total mark of at least $18 \times 10\frac{1}{2} = 189$; *haud illaudibilis primi gradus*, for which is required a total mark of at least $18 \times 6\frac{1}{2} = 117$; *haud illaudabilis secundi gradus*, for which is required a total mark of at least 105.

At the clinical tests in dermato-venereology, ophthalmology, otolaryngology and the written examination in psychiatry the candidates are classed as "passed" or "failed." No candidate can present himself for part II of the medical examination before having passed these tests.

The Graduation.—After having passed the final examination of the medical school the graduate will, in accordance with Chancellery Order of 1815, take a vow at a formal

session in the presence of the Dean of the faculty, the wording of which is as follows:

Having been publicly tested in my knowledge of medicine and surgery, I hereby take the vow, having also given my hand as a pledge of faith, that I shall always in my practice as a doctor endeavour to use my knowledge to the best of my judgment with zeal and care for the benefit of society and my fellow-beings; that I shall attend as conscientiously to the poor as the rich without respect of persons; that I shall not unauthorized divulge what I have learnt in my capacity as a doctor; that I shall endeavour always to improve my knowledge, and, moreover, make myself acquainted with and truly observe the decrees and instructions relating to me and my profession.

The medical student has now become *candidatus* (candidata) *medicinæ et chirurgicæ*.

A total of 200–250 graduate from the two medical schools per annum.

The license to practice.—After one year of compulsory internship the candidate obtains the license to practice from the Director of the Public Health Department. In order to obtain a license for dental practice it is necessary to pass a special examination at the Royal Dental College.

Postgraduate clinical training.—About half of the graduates will eventually become general practitioners, generally after a fairly good postgraduate training.

After the compulsory internship a voluntary postgraduate clinical training in hospitals for 2–3 years is the average for general practitioners, and many take further training as assistants to general practitioners.

Authorization as a specialist is issued by the Ministry of Internal Affairs on the recommendation of the Director of the Public Health Department, which in accordance with the Medical Legislation has taken council with a committee in which the medical scientific societies are strongly represented.

The training as a specialist has up to now been clinical. To become a specialist for instance in internal medicine the following training is demanded: (*a*) one year of internship, (*b*) one year of clinical training outside the special claims, which are (*c*) 3 years' service as an assistant physician (full-time) in a department of internal medicine, and (*d*) broad clinical training (at least 1 year) in disciplines related to internal medicine, for instance, in a pediatric or dermatological department.

It is not possible to obtain a license as a specialist with less than 6 years' postgraduate training, but in most cases it will take 8–10 years because of the heavy competition to obtain a position as assistant physician in a medical department.

In some of the specialities, postgraduate courses may substitute for some of the clinical training, but the courses are not compulsory, and no examinations have to be passed.

Postgraduate university degree.—About 10–15 per cent of the graduates obtain a postgraduate university degree: *doctor medicinæ*. In order to obtain this a thesis is written on the basis of extensive (very often 5 years or more) personal research.

The thesis is critically evaluated by a committee of two or three members of the Medical Faculty, sometimes partly substituted by experts from outside. If the thesis is recommended by this committee and accepted by the faculty, it is then printed. At a formal session at the university, under the direction of the Dean, the thesis is discussed in public by two members of the committee and other graduates of the university, who might wish to participate. If no serious objections have been raised during this procedure the author of the thesis will be proclaimed *doctor medicinæ*, and he has now obtained *jus docendi*, the right to teach at the university.

Medical Research in India

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भारत में औषधशास्त्रीय गवेषणा

लेखक

प्रोफेसर पी०एन०वाही, एम०बी०, बी०एस०, एम०डी०, एम०आर०सी०पी०(लंदन)एफ०एन०आई०,
प्रोफेसर तथा अध्यक्ष पेथालाजी विभाग
स०ना०मेडीकल कालेज, आ ग रा (इंडिया)

सार

सरकार की पंचवर्षीय राष्ट्रीय विकास योजनाओंने भारत में मेडीकल गवेषणा के संवर्द्धन को अत्यन्त प्राथमिकता का स्थान दिया है। चिकित्सकीय गवेषणा की भारतीय परिषद ने मेडीकल कालेजों में गवेष्य आयोजनाओं को पुष्टि प्रदान करके गवेषणा को पुनर्गठित करने और व्यवस्थित करने में हाल के वर्षों में बहुत योग दिया है। इसने अर्द्ध स्थायी गवेषणा यूनिटों को भी खड़ा किया है जिनमें वरिष्ठ कार्यकर्त्ता हैं। यह गवेषणामें प्रशिक्षण प्राप्त करने के लिए मेडीकल स्नातकों को फेलोशिप भी प्रदान करती है। भारतीय विश्वविद्यालयराष्ट्र की नयी तथा मार्मिक बौद्धिक आवश्यकताओं की पूर्तिके लिए अपने उत्तरदायित्व के प्रति जागरूक हैं, अत: उन्हें शीघ्र ही आगे बढ़ कर इस आह्वान को स्वीकार करना पड़ेगा।

यदि अध्यापन-विभागों को गवेषणा के क्षेत्र में प्रभावशाली योग देना है तो तीन महत्वपूर्ण शर्तें पूरी की जानी चाहियें : पूरे समयवाले अध्यापकों तथा गवेषकों की नियुक्ति, उचित प्रकार के अध्यापकों का निर्वाचन, तथा कार्यकर्त्ताओं के लिए समुचित धन की सुविधा। आगे, और भी अच्छी व्यवस्था तथा धन के और भी अच्छे उपयोग के लिए राज्य सरकार को 'राज्य स्नातकोत्तरीय मेडीकल शिक्षा तथा गवेषणा परिषदों' की रचना करनी चाहिये।

एक और पहलू गंभीर विचार चाहता है, वह है देश की गवेषण क्षमता को बढ़ाना। ऐसा करने के लिए यह आवश्यक होगा कि स्नातक-पूर्वीय तथा स्नातकोत्तरीय मेडीकल शिक्षा के कार्यक्रम को पुनर्गठित किया जाय। स्वेच्छीय समय तथा प्रयोगात्मक औषधशास्त्र के

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प्रशिक्षण को पाठ्य क्रम में स्थान दिया जाय। निवासियों तथा अंतरिष्टों को गवेषणा करने के लिए प्रोत्साहित करना चाहिये। सुधरी वेतन दरें, नौकरी की सुरक्षा, गवेषणा और अध्यापन की सुसंबद्धता तथा उच्चतर अध्ययन के अवसरों की सुविधा देकर गवेषणा करनेवालों की स्थिति को संभाला जाना चाहिये।

भावी योजना-विधानों के लिए यह सुझाव प्रस्तुत किया जाता है कि स्थायी गवेषणा परिकर खड़ा किया जाना चाहिये तथा विविध विषयों में निश्चित प्रशिक्षण कार्यक्रमों की व्यवस्था गवेषकों के लिए नियोजित होनी चाहिये। गवेषकों को वैज्ञानिक साहित्य उपलब्ध कराने के लिए 'वैज्ञानिक सूचना सेवा विभाग' स्थापित होना चाहिये। ग्रामीण स्वास्थ्य की समस्याओं तथा देशी औषधियों के अध्ययन तथा गवेषणा को प्राथमिकता दी जाय।

सभी अड़चनों के रहते हुए भी चिकित्सकीय गवेषणा ने भारत में उल्लेखनीय प्रगति की है और वह अपनी समृद्धिके उस दौर पर पहुंच चुकी है जिस पर से निरंतर उन्नति का आश्वासन मिलता है। राष्ट्रीय स्वास्थ्य के मान को ऊंचा उठाने की इच्छा ने इस दिशा में गति को बहुत तीव्र कर दिया है तथा भारत में आज मेडीकल गवेषणा निस्वार्थ समर्पण की भावना से की जा रही है।

Medical research has not developed to the same extent in India as in some other countries. This is in spite of the fact that wide prevalence of communicable diseases in the country at the end of the last century and the beginning of the present one offered unlimited opportunities for research. The factors responsible were lack of trained per-

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sonnel, absence of governmental initiative in providing opportunities and funds, and complete apathy of medical colleges and universities to development of research. With the attainment of independence and establishment of democratic government, the deficiencies in the activities in the field of medical research and in the provisions for medical research have been more and more evident. The 5-year plans have laid great emphasis on the promotion of national health. With the recognition of the crucial part that medical research plays in the promotion of health, a high premium has been placed on research in the plans for the country's development. Medical research in India is being reorganized on planned program basis, and its scope expanded.

Historical background.—Before 1911 when the Indian Research Fund Association was created by the Government of India, there was no organized body to promote or coordinate medical research in India. Individual notable contributions were, however, made mainly by foreign medical men of the Indian Medical Service attached to medical colleges or All-India Institutes. In this connection, mention may be made of the work of Sir Ronald Ross in 1897 on the role of the anopheles mosquito in the transmission of malaria and of Haffkine on plague vaccine. Other contributions at this period were the works of Carter on spirillum of relapsing fever, and Lewis on trypanosomes. Macnamara and Cunningham's work on cholera, and Fayer's work on snake venoms were also valuable. During this period three research institutes were also opened—the Central Research Institute at Kasauli, the Haffkine Institute at Bombay, and the King Institute at Guindy. These were administered by the Medical Research Department of the Government of India.

The Indian Research Fund Association was established by the Government of India in 1911. Its aims were "to initiate, aid, develop and coordinate medical scientific research in India, to promote special inquiries and to assist institutions engaged in the study of diseases, their prevention, causation and remedy." The Association did useful work in spite of its limited resources. Such major health problems as malnutrition, rabies, plague, malaria, cholera, leprosy, and kala-azar were successfully tackled by workers whose researches were sponsored by the Association.

In 1946 the Government of India appointed a Health Survey and Development Committee for reviewing the whole field of medical research in India. The Committee made some pertinent observations such as "the almost complete absence of organized medical research in various departments of medical colleges; deficiency of trained personnel to undertake research; and progressively diminishing research activity of the specialized institutes in direct proportion to the increase in the volume of routine duties which these institutes have been asked upon to undertake." In order to remove the defects, the committee made certain recommendations, i.e., (*a*) the establishment of a center for post-graduate training and research, (*b*) establishment of special institutes for research in specific diseases, and (*c*) creation of a statutory body for the purpose of formulating policies for the development of medical research in India, stimulation of medical research in universities, and selection and training of medical research workers in the country.

Indian Council of Medical Research.—The most important step in the evolution of medical research in India was taken with the establishment of the Indian Council of Medical Research in 1949. This Council not only took over the functions of I.R.F.A., but has completely revolutionized the pattern and scope of medical research in India. The council derives its financial support almost entirely from the Government of India and functions in close association with the Ministry of Health.

The Council was created and is functioning at a very momentous period in the history of this country, the period of successive national Five-Year Plans when the nation has dedicated itself to unceasing efforts at raising the level of its socio-economic and

cultural life. It is but natural that the Council should have completely reorientated its program of research activities in this country to bring them in line with the nation's needs and aspirations. The objectives were defined in the Council's report on Medical Research in the Second Five-Year Plan:

1. "Strengthening of the facilities available for research in existing institutions in the country in order that they may render greater service than in the past in their special spheres of study.
2. "Creation of new Institutes for research in specific fields.
3. "Training of research workers by a system of fellowship and by other means.
4. "Providing opportunities for maximum display of talent of research workers by facing them with appropriate challenging situations;
5. "Creating conditions by the formation of a Research Cadre, by which young and promising workers may be attracted to a career in research and by which they may be induced to remain in research.
6. "Initiating research programmes for the solution of the many urgent problems in the fields of medicine and public health; and maintaining close co-operation with national and international agencies in all matters pertaining to research."

As a further step toward this reorganization, the Scientific Advisory Board of the Council arranged a symposium in 1954 on medical research in relation to the second 5-year plan. This was attended by educationalists and research workers from all over the country. In the words of the Council's Director, "At this symposium, the die was cast for a great forward movement in medical research, unprecedented in its history."

The Council controls its scientific and technical activities through its Scientific Advisory Board and the various Advisory Committees on which eminent research workers are invited to work. The Scientific Advisory Board and its Advisory Committees meet once a year. At this time they review the work of the various research projects, scrutinize the new proposals, indicate possible further lines of work, and recommend the grants. They also suggest future policies on various matters connected with medical research.

The efforts of the Council to reorganize the research pattern of the country and formulate a wider plan for future work have resulted in an inevitable expansion and reshaping of its programs. An obvious result has been the increasing support to research projects by the Council in medical colleges, universities, research laboratories, and institutions. The Central and State Governments are also experiencing the effectiveness of the Council's policies through its co-operation in their public health programs, and the common endeavor is bearing visible fruits in raising the health standard of the nation. The council has succeeded in making the advance of medicine a problem and a challenge for the medical student so that this activity is no longer confined to a few isolated institutions. The association of medical research with medical colleges is helping the country to lay bare its research potential by inducing an increasing number of medical graduates to devote themselves wholly to research. This has in turn led to increased emphasis on the training of research workers.

The Indian Council of Medical Research has also been able to get an increasing collaboration with international organizations in its efforts to create facilities for research, e.g., Rockefeller Foundation, the World Health Organization, the Technical Cooperation Mission of the U.S.A., and the UNICEF. Establishment of the Virus Research Centre at Poona and provision of equipment to other Virus laboratories in the country are examples of Rockefeller Foundation's help. Similarly, the W.H.O. has assisted the Council in its work on protein malnutrition, tuberculosis, and trachoma. The T.C.M. has played an important part in equipping medical colleges and providing funds for the training of workers abroad. The UNICEF has been very helpful in our programs of maternal and child health.

Research in medical colleges and universities.—Until recently medical research in

India has been mostly confined to the few research and post-graduate teaching institutions. This was due to the fact that the States and the Universities in India have not effectively adopted the notion that medical colleges constitute their principal centers for research in basic and clinical sciences. In most of the medical colleges active scientific research was not encouraged, and no funds for research were available. The usual excuse has been that colleges are primarily for teaching only. This is just the opposite of the prevailing idea in scientifically advanced countries, where research is considered an integral activity of the medical colleges and a teacher, to command recognition, has to have research to his credit. The Bhore Committee mentioned two important reasons for this apathy of the colleges toward research: (*a*) ignorance on the part of the authorities of the importance of research in relation to the maintenance of a high standard of teaching and the development of the right attitude of mind in the student; and (*b*) insufficient personnel of the right type.

Prof. Bennet of Johns Hopkins University, who recently visited India, made some very important observations which could well be seriously considered by our State Governments and Universities: "Quite apart from advancement of knowledge, solution of problems, and the discovery of new facts, research is important in medical colleges because it serves as a constant reminder that medicine is not a changeless field. To participate in research is incumbent upon every medical teacher, for through it one develops the ability to accept one's own or another's observations with caution and to interpret critically what is published, demanding documentation and conceding nothing to authoritarianism or empiricism. This is what is generally lacking in faculty and in student in India today and only through research (not so called research-minded men) can this important lack be filled."

The universities in India, unfortunately, have not made their due contribution to medical research. This is primarily due to the fact that in this country the majority of medical colleges are run by the Government and these colleges are only affiliated to the universities. This has been one of the important reasons for indifferent promotion of fundamental research, since, by and large, this is largely the domain of the universities. It is time that the Indian University, which, with its responsibility for meeting the new and deep-felt intellectual needs of the nation, should step forward and accept the challenge offered by research, by setting capable workers at work in surroundings most adapted to fructify imagination. The following observation by the Canadian Royal Commission is pertinent: "To provide complete freedom to the individual worker to choose his path and to follow it without thought of practical results has been the pride of the universities in the past. Government laboratories with all their advantages cannot produce this special atmosphere." The necessity is felt more and more now, since there is increasing demand for science graduates in medical research projects.

The teaching institutes staffed with young and willing workers should be considered the right place to stimulate and organize research. The important thing to realize, when the research activities are being planned in this country, is that effective medical research can only be conducted in a teaching department with its resources of personnel, equipment, and clinical material. The colleges are likely to be a major source of original work and will also supply the country's future research workers. To achieve the basic necessity for promotion of medical research in the teaching institutions, it is necessary to consider this problem from three facets:

1. Appointment of whole-time staff and research workers in the medical colleges.
2. Selection of teachers.
3. Availability of adequate funds and the methods of their disposal.

In most of the medical colleges at present, it is only the pre-clinical staff which is

whole-time, and this is the reason why any original work that comes out of these institutions is in basic sciences. However, most of us feel that the growth of scientific knowledge has progressed to a stage when clinical research can be developed. There is a tremendous unexplored clinical field in this country, and a substantial penetration by systematic scientific research is overdue. This would ultimately depend upon the number of whole-time clinical departments in the medical colleges. It is, therefore, the first essential in any planning of research that both the pre-clinical and clinical departments should have whole-time staff and clinical research workers. In the universities, where it is considered not feasible to stop the private practice of clinical staff, some whole-time teaching units and research units should be created. The staff in these research units should be of the same status as the staff of the teaching units.

Another aspect of the problem to be considered is that most of the medical colleges are under-staffed, and the available staff is overburdened with routine duties. Many who would like to do research, cannot. The teacher in an Indian college has multifarious duties to perform. He has to do teaching, hospital service, and administration (including committee work). He cannot avoid these three things. If he now finds time he may do research. Increase in the personnel is to be seriously considered.

Still more important is the selection of the teachers. Great emphasis should be laid on the research to their credit, on the value and originality of their discourses, and no funds should be spared to secure them. Oratory aptitude or the results of competitive examinations should not be decisive factors. The unfortunate tendency in this country to spend money on huge buildings and costly equipment, at the same time grudging to pay a decent salary to staff, should be combatted. A make-do research worker will do nothing of any worth, even if he has at his disposal sumptuous laboratories and huge funds. It is necessary at first to spare no funds to secure the right people and then to provide them with the necessary laboratories and the funds for real research. The recent suggestion of the Government of India to organize an All-India Cadre of whole-time medical personnel for the colleges with decent salaries and no differentiation between the clinical and pre-clinical teachers seems to me a move in the right direction.

Minutely linked with the problem of creation of whole-time teaching and research units staffed with people of right caliber is the question of funds for research and equipment at the disposal of workers. In most of the medical colleges no funds for research are available. In some, a few temporary posts of junior research workers have been created, but they have not been allotted funds to purchase their requirements. The result is that they have either to spend from their own salary or to draw upon the already very meager resources of the departments. The private sources of revenue are limited in the Indian universities, and, if the research is to be well organized, the State will have to subsidize this. The danger is that State subsidy has a tendency to impose restrictions on the liberty of the colleges and the individual workers. In any planning for increasing the research potential of this country, the question of improved financing (including volume of funds and devices for granting them) has therefore to be considered.

However, if large sources of money have to be made available to the universities for research, some sort of organization is necessary to insure the correct utilization of the funds. These have to be at the level of Centre, State, and the college. The Central Government has realized that it has to play a significant role to stimulate medical research. This has resulted in the re-orientation of the policy of the Indian Council of Medical Research toward university departments in recent years. It has set up research units, given grants to medical research workers, and awarded fellowships to medical graduates. The council has made another notable contribution to the promo-

tion of research. Through its advisory committees, it advises and encourages the research workers in different fields and, normally having different loyalties, to collaborate freely in co-ordinated team work.

From time to time proposals are made to give grants to the colleges or universities and not to individual workers. The reason given is that grants to individuals is being criticized as favoritism toward them. We should not give in to such untenable criticisms from persons who lack the intellectual honesty of a research worker. The grants by the council are given on the recommendation of its advisory bodies composed of known research workers. On the other hand, if these are left to the college heads, who need not be better teachers or research workers, official sanction of every article may be demanded, and an experiment may be held up for days because sanction of a reagent was not available due to college holidays. An investigator whose subsistence depends upon an unstable patchwork of categorical research grants is laboring under a serious handicap. The research grants should have flexibility of administration, and the competence of the investigator for the responsibility of their expenditure should be acknowledged.

However, it is more than probable that the State Governments will insist on control on funds given by them. To meet this, establishment of State Research Councils and College Research Councils for decentralized research, as contrasted to research at national level organized by I.C.M.R., should be considered. These bodies should be given the greatest possible freedom to promote research. Proper development of medical research requires the participation of universities, colleges, and special research organizations. Creation of State Research Councils will, to a large extent, bring about this collaboration. It will also help to keep out politics from research, which is absolutely desirable.

In spite of some of the inherent defects in our research planning we find that the scene is rapidly changing. Research is occupying an increasingly important place in Indian college activities. Several factors have contributed to this creditable improvement in the quantity and quality of research in the medical college within the last decade. The chief among them is the reorientation of the research program in the country brought about by Indian Council of Medical Research. The adoption of the concept that association of research with teaching not only enriches teaching but helps in increasing the country's research potential and selection of future research workers has been the milestone in the development of research in this country. The Council is now consistently giving liberal research grants to individuals and collaborating research projects from the colleges. Some of the State Governments have also established their own Research Councils and provided funds for financing research projects. Though these are meager, still it is a hopeful step in the right direction. Another factor that has made an effective impact on the young medical graduates is the holding of the annual meetings of the Indian Council of Medical Research in medical colleges. This contact of the young undergraduates and the junior staff with the research workers from all over the country has had the most galvanizing effect in promoting research activities in the colleges. The Council has also undertaken another important step in promoting research in colleges, i.e., establishment of research units in some medical colleges, in order to give facilities to senior and recognized research workers, on an organized long-term basis. Lastly the I.C.M.R./Rockefeller Foundation fellowship program, with the object of providing opportunities for higher training in teaching and research methods for the junior members of the staff, is bound to help provide the requisite personnel.

Research potential of the country.—The demand for research workers far exceeds the supply in the country. Because of the fact that most training programs in the colleges are designed to meet the university requirements for graduation, with practical-

ly no attempt to provide experience in the field of research, the shortage of research workers is understandable. There are many factors that contribute to this situation. I shall attempt to deal with a few which to my mind are not only important but, if remedied, will effectively contribute toward improvement.

The first and foremost to my mind is the defective medical curriculum in Medical Colleges. The program of medical education should be so formulated that it takes into consideration not only the problem of how to produce a doctor, but also the responsibility of producing one who will be actively interested in the progress of medical research. This attitude has to be developed at the undergraduate level. This is part and parcel of the bigger research which is developed at the postgraduate level. Without this attitude there can never be correct initiation into original thinking, and the paths that one will travel in research may not lead to the desired destination.

Perhaps this is placing too high a demand on the average medical student, but some move can be made in the proposed direction if certain aspects of the present medical curriculum can be rearranged. The absence of an effective research program for medical students, which would emphasize this important role of critical reasoning and evaluation in the study of disease and management of patient, is to my mind the most potent single factor responsible for the paucity of research workers. Any reorientation of medical curriculum should provide for an elective training program, whereby the student can be provided with opportunities to perform experiments as a part of the curriculum, in order to emphasize the dynamic concept of disease. The student will thus get the opportunity to test his aptitude, and some with a strong positive bias are very likely to choose research as a career. The present curriculum of set lectures, demonstrations, etc., without giving any opportunity to the student to make discoveries for himself, is responsible for the present educational mould which does not allow sufficiently for individual variation.

Another important consideration that should definitely help more people to adopt research as a career is the institution of a training program in experimental medicine. This should be provided both at the undergraduate and postgraduate level. This may be followed by a program of research training at the beginning of the internship or residency and continued on an individualized basis to meet the particular interests of the trainee for a number of years. All residents and junior staff should be encouraged to do research. Outstanding accomplishments by the young research workers may be awarded by prizes, honors, or other recognitions. Better students may be encouraged to do research with staff members or provided with part-time employment in the departments to develop further interest.

The integration of teaching and research is thus desirable. This may vary from introduction of experimental methods in undergraduate teaching to the conduct of fundamental and clinical research by postgraduates. It is the stage when the medical man must be transfused with the spirit of scientific curiosity. If the supply of future research workers is to be insured, the undergraduates and postgraduates must be impressed that research is not limited to those with special aptitude but that initiative, diligence, and correct observation will permit them to take up serious investigative work.

Together with this replanning of the educational program, we have to consider the ways and means which will aid in attracting good candidates to a career involving research. The academic institutions should establish more effective research and teaching programs for medical students, interns, and residents. This would be helped by the establishment of full-time or part-time research and training opportunities for medical students and residents.

One of the greatest deterrents to serious research is the teaching and service load of the departments which the staff has to bear. It would thus be helpful if teaching institutions would establish financially at-

tractive positions at all ranks in the departments in order that the teaching and service load may be effectively distributed to allow staff members more time for research. This would help in establishing a better balance between teaching, service, and research.

Creation of additional opportunities for career investigators would be another helpful step. There is a section of educationalists who think that the situation can be improved by establishing Research Professorships. I have my strong doubts if this is the correct solution, because this tends to provide only one man with the research opportunities which his colleagues wish they had. It is preferable to increase the number of professional staff and their technical personnel in keeping with their teaching and service responsibilities and thereby afford more opportunities for research to all. A staff composed of stimulating men with talents both in teaching and research will win prestige for the department, a type of prestige so essential for good recruitment. Teachers lacking in these personal qualifications, even though they have good minds for research, are not suited for teaching institutions. Their specialized talents should be better utilized in research institutions.

The greatest responsibility, however, falls on those who advise in selection of teachers. They should recognize the importance of quality standard. Unfortunately, the hospital service load on the departments is so much that more often there is no choice in selection, and appointments are given on the basis of availability, even though the applicants are misfits. I would strongly urge that the head of the department should have the courage of his convictions and must be prepared to have certain positions temporarily unfilled, rather than to fill these with men of inferior caliber. This is only possible if the professor is the recruiting agent for his department which is, however, a rare thing in this country. The usual practice is that the Deans, Principals, or Government do not even invite suggestions from the Professor nor appoint him as an advisor to this selection board.

Lastly, we must try to understand the viewpoint of the research workers. There are many difficulties for a young research worker in this country. Unless the salaries of the research posts are improved, it is very difficult for a young medical man primarily groomed for a lucrative clinical career, to choose research as career. This economic factor I feel is the most potent deterrent to the active research program of a university department—more so because in research he loses all the human touch, being confined within the four walls of his laboratory especially in nonclinical subjects. It is very seldom that at present he gets an appreciative audience in medical colleges, which could feel happy about his contribution to fundamental sciences.

Most of the research posts are nonteaching jobs, and for all permanent teaching jobs, teaching experience rather than research experience is considered, with the result that, when his temporary tenure of research appointment finishes, the research scholar is no better suited to start his academic career than he was at the beginning of it. Owing to his temporary appointment he also cannot avail of any foreign research fellowships for further study, which even the junior but permanent staff may get, since these grants require somebody to stand for re-employment of the person concerned. It is suggested that improved salary and the inclusion of a teaching program which will be recognized by Public Service Commission, along with provisions for further study, would help in these manifold problems.

Admittedly, the increase in research potential is a multifaceted problem. It is a problem of making the career of research workers more attractive, and this is the responsibility of the universities and the Government. There is the problem of selection of the right type of personnel for departments—finding a square peg for the square hole. This is again for the universities, Government, and Public Service Commissions. Here the head of the department should have the major voice. Finally, there

are the economic problem connected with a long training period and the provision of a permanent well-paid research cadre. All these aspects have to be tackled simultaneously before the medical graduates can be attracted to adopt a research career in this country.

Present achievements and future plans.—In viewing the achievements one has to admit that these have been more in planning than in results. This has to be considered with the background of existing conditions, i.e., limited finances, paucity of trained personnel, and teachers overburdened with routine duties, etc.

During this plan period the main emphasis has been on applied research, the results of which could be immediately applied to the betterment of the nation's health. Study of communicable diseases, malnutrition, environmental hygiene, and other health problems have been the major preoccupations. The control programs against malaria, filariasis, trachoma, tuberculosis, leprosy, plague, schistosomiasis, etc., are examples of applied research which has occupied the attention of research workers. Though it has to be admitted that fundamental research has been relegated to a second place, still the basic laboratory research and the applied research are so interdependent for successful progress and production of effective results that the former was encouraged whenever deemed necessary. In any future plans applied research will still have to be given priority.

In the planning of research, the outstanding contribution has been of the I.C.M.R. In the words of its Director, "medical research is no longer confined, as in the days of the I.R.F.A., to a few research institutes which are for the most part situated in hill stations, usually out of contact with the large teaching hospitals. It has been brought to where it belongs—to centres of teaching and learning, to centres where there is a wealth of clinical material and where opportunities of study of human afflictions abound."

A number of research units manned by full-time personnel have been established in medical colleges, i.e., Liver Diseases Research Unit at Agra, the Neuropathological Unit at Bombay, the Nutritional Research Units at Bombay and Calcutta, the Clinical Research Units at Calcutta and Bombay, and the Neurophysiology Unit in Delhi. Besides, eight drug research units, five long-term projects for the study of atherosclerosis and hypertension, and five therapeutic trial units are being organized. This is in addition to short-term grants which workers in practically all the medical colleges are receiving. Besides the above, an Industrial Health Research Unit has been established at the All-India Institute of Hygiene and Public Health, Calcutta, Haematological Research Unit at the School of Tropical Medicine, Calcutta, Drugs Research Institute at Jammu, Mental Health Institute at Bangalore, and a Blood Group Reference Centre at Bombay. The establishment of the following three new institutes is under consideration: Institute of Biology, Institute for research in Occupational Health, and a Virus Research Institute.

Research Cadre.—Together with the provision for increasing physical facilities, it is being realized that conditions of the research workers must be improved and the scientist should be assured security of service. The present terms of service and emoluments offered to the research workers are so inadequate that these will not attract good men to a research career or retain them there. Research is to be carried on by full-time officers, adequately paid and permanently employed. It is heartening to note that the Planning Commission of the Government of India has accepted the idea of a cadre of medical research workers. The following are the basic features of the Cadre:[1]

1. The cadre must be sufficiently broad-based to meet the growing needs of modern research and consist of representatives of all fields of medical science including biophysics, statistics, epidemiology; it must be so constituted as to be capable of tackling any health problem that the country might be faced with;

[1] I.C.M.R. A Review of Activities during the Year 1950–57.

2. The cadre must be flexible; there must be provision for adding personnel to it as and when suitable talent is available;

3. Irrespective of the field in which a person may be working, there should be opportunities for promotion on the basis of the quality of work done by him; and

4. An intimate association must be secured between members of the teaching and research cadres.

With the paucity of personnel trained in research techniques, the creation of research cadres will not be the whole answer unless positive steps are taken for training of research workers. This is an essential function of any research organization, and the Indian Council of Medical Research and the State Research Councils have to give this problem a concrete shape. The former have adopted a definite program of training of medical research workers by instituting fellowships for young scientists and research workers under suitable direction. For the last few years this program has been modified to include the junior teachers in medical colleges also, and is being partially financed by the Rockefeller Foundation. This reorientated ICMR/RF fellowships program has the following objectives:[2]

1. Training of teachers and research workers for medical college staff with emphasis on research as a component of good teaching.

2. Aiding the development of certain departments in medical colleges as post-graduate training centers through providing them with able young doctors in training, who would assist in their teaching and research programs.

3. Improving the value of and the respect for Indian Medical qualifications. Foreign post-graduate training, now so largely relied upon, can never meet the quantitative needs for competent medical teachers in India, nor is training abroad under totally different conditions the best preparation for a medical or scientific career in India.

Another worth-while step would be to arrange refresher courses for research workers and teachers, in specialized research laboratories. It is desirable that such courses should be extended to training in research techniques and the use of research equipment. Training in epidemiological research should also be given utmost consideration.

Division of Experimental Medicine in the medical colleges.—It has often been debated as to the best way research, both applied and fundamental, can be encouraged. Suggestions have been made for establishing special research institutes for the purpose. No one will deny the usefulness of such institutes, but the question has to be considered vis-à-vis the country's resources. The consensus is that if such specialized institutes have to be developed, they should be organized within the universities, and every effort should be made for a very close collaboration between the university departments and the research institutes. It would, however, be more economical and useful if instead of one or two such institutions, several research units are created in the existing medical colleges. The institution of special departments of experimental medicine or of research medicine should therefore be seriously considered. The Indian Council of Medical Research is thinking along these lines. Most of the colleges lack accommodation, equipment, and the necessary staff to create such divisions on their own. Funds will have to be provided for building, equipment, and maintenance of technical and research staff. With the provision of such units research programs, especially in the clinical departments, will make a certain headway. It would also be necessary to have a special ward earmarked for research beds, well equipped for clinical research programs. However, the success of such research divisions will depend upon stability of the position of the research staff, intellectual opportunity and freedom, availability of physical facilities, and a good salary standard.

Scientific Information Service.—In any plan for expansion of medical research in this country, the easy access to scientific information is imperative, especially when the libraries in the medical colleges are not adequately supplied with books and journals.

[2] I.C.M.R. Medical Research in the Second Five Year Plan.

The Indian Council of Medical Research is seriously considering the establishment of a center for the collection, correlation, and dissemination of scientific information. At the Baroda symposium a suggestion was made for the creation of a research intelligence unit to review concurrent research programs in other parts of the world and to make this information available to workers in India. It was envisaged that such reviews, besides abstracting the work already done, will also provide a critical analysis of the data in order to insure their intelligent applicability by the workers on similar problem. It is possible that the World Health Organization will collaborate in this project.

Study of rural health problems.—It is the essential aim of all health programs that these must be organized to fulfill the needs of the people. The total population of India is about 390 million, 82 per cent of whom live in 558,089 villages. It is therefore obvious that all our efforts to improve the health standards of the nation should be primarily directed toward the villages. The structure of health services to be provided there will obviously be very different from urban requirements. A concentrated study of the pattern of diseases in the rural areas will mean a parallel study of the mode of life of people there, including their economic standards. An accurate knowledge about the vital statistics of the village population is another important study.

The Indian Council of Medical Research has supported field studies to ascertain the actual neonatal and infant mortality rates in rural communities. An interesting study, under the combined effort of the Government of India and the Harvard University is in progress in Punjab, to investigate the population dynamics of the inhabitants in the Khanna area. Such studies should be further extended in other areas to get the birth and mortality data, main illnesses and their causes, etc. The knowledge gained will be really helpful in planning for medical care in rural areas. There is a proposal to extend similar studies to tribal areas.

Research in indigenous drugs.—There is no getting away from the fact that indigenous medicine still plays an important role in the life of Indians. The Government has recognized this and has opened a large number of Ayurvedic and Unani dispensaries in the rural areas and also a number of colleges of Indian Medicine. It has been a constant argument whether practitioners of indigenous systems of medicine should be permitted or there should be only one system of practice of medicine in India, i.e., modern medicine. While no one denies the established value of modern medicine and the desirability of its benefit's being available to as large a section of the population as possible, yet a powerful force backing the indigenous system is Indian nationalism. During the present period of transition, when the nation is so conscious of her cultural heritage and is trying to revive her past glory, the demand for the recognition of the indigenous system is understandable. It is further argued that the Ayurvedic system may not provide a cure for all maladies, but this is no reason why it should not be used to deal with ailments in which it has proved to be efficacious, especially when it is considerably cheaper.

The Central Government in 1954 expressed its views as follows: "since the existence of several systems of medicine in the country was a source of confusion, Government felt that only one system of medicine should be recognised, although contribution from other systems could be profitably incorporated." With this aim, research in indigenous drugs is being encouraged. The establishment of drug research units in medical colleges, the Central Drug Research Institute at Lucknow, the Indigenous Drug Research Laboratory at Jammu, and the Central Institute of Research in Indigenous Medicine at Jamnagar, are examples of Governmental effort to help to discover the innumerable remedies of therapeutic value in this system of medicine. In addition, a good number of pharmacologists are given yearly grants for indigenous drugs inquiries. As the drug research program expands, the demand for

clinical trials of these drugs will also increase. The I.C.M.R. is proposing to establish therapeutic trial units in certain teaching hospitals.

This program will not only help to provide effective drugs to the public at a cheap price but will also help in the achievement of the country's goal of self-sufficiency in drugs. If Rauwolfia Serpentina (Chota chand), the drug now widely acclaimed in the treatment of hypertension, can be investigated in India by Indian workers, why not others? Some other indigenous drugs on which research is being carried on are: Azardirachta indica (Nim), Leea hirta (Kakajangha), Cassia absus (Chaksu), and Adhatoda Vasaca (Adulasa) for their antibiotic principles; indigenous plants like Alpinagolanga (Beri pankijar) and Acorus Calamus (Bach) are being studied for antituberculosis properties. These are only a few of the large number of indigenous drugs that are being given a scientific appraisal.

Another important step that is being considered, and is being adopted as and when finances permit, is to create a chair of the History of Medicine in the medical colleges, so that students of modern medicine will have an insight into the systems of medicine practised in this country at a time when the so-called modern medicine did not exist. This is a very useful idea as a middle course between the demand for integration of modern and indigenous systems on the one hand and no recognition of indigenous system on the other hand. In the words of Sigerist "This would permit us to preserve and to incorporate into our scientific system of medicine whatever is found to be of value in this indigenous system. And it would also permit the objective refutation of claims that are not justified."

Concluding remarks.—It will be seen that medical research in India has struck a stride and reached a phase in its growth assuring continued development. The most spectacular achievement has been the response of the medical intellect as a result of the demands made upon it by the changing circumstances of an independent country. In particular, the desire to raise the standard of national health has greatly accelerated the pace at which demands are coming from workers in the fundamental and clinical sciences for financial support of their ever-increasing research projects.

It is something to our credit, and very heartening to observe, that the Union and State Governments and the Universities are willing to meet the challenge with unrecorded vigor and freshness of approach. It will take some time before the impact of the research effort in the country in furthering human welfare will be fully appreciated by the general public. To my mind, however, this is the least important aspect of the problem. More important is the fact that medical research in India today is being pursued with a spirit of selfless and unself-conscious dedication to the problems in hand.

Present Trends of Medical Education in Mexico

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En México, al igual que en muchos otros países, se está llevando a cabo un cuidadoso análisis de los problemas relacionados con la enseñanza de la medicina con la finalidad de formar un profesionista más de acuerdo con las necesidades actuales del país.

El hecho prominente en las reformas que se están llevando a cabo en la educación médica en México, es que para la programación de todas estas actividades, se parte de una concepción humanística, es decir, los programas de educación médica se organizan en función del hombre, no sólo viendo al individuo en lo que en sí representa, sino como miembro de una comunidad en la que vive y actúa. Esto de tanta importancia para las necesidades específicas de México da un sello especial al programa de re-estructuración en sus programas de enseñanza.

Un hecho evidente en el movimiento de reorganización de la educación médica en México es la resistencia a aceptar, sin una profunda meditación y análisis previos, sistemas de enseñanza que no van de acuerdo con sus sistemas tradicionales de educación a pesar de que en otros países han dado resultados satisfactorios. Este aspecto es interesante pues seguramente como resultado de esta resistencia, germinará un sistema educacional más de acuerdo con la realidad mexicana, adaptado a sus polifacéticas características culturales, sociales y económicas. México sigue con interés las diferentes tentativas de reorganización que se llevan a cabo en otras partes del mundo y trata de adaptar al núcleo básico de sus programas educacionales autóctonos, principalmente aquellas características de los programas que han dado resultados provechosos en países con características étnicas y socio-económicas semejantes a las de él.

La Asociación Mexicana de Escuelas de Medicina, que agrupa los 19 centros de enseñanza médica en México, es un elemento que colabora en los programas de reorganización de la enseñanza de la medicina, encaminados a dotar de adecuada atención médica a una población de más de 33 millones de habitantes, con que México contará para mediados del presente año. Se considera que la proporción actual, de 6.2 médicos por 10,000 habitantes, es baja tomando en cuenta las necesidades actuales de México desde el punto de vista de salud.

Además de los esfuerzos que se llevan a cabo para mejorar la enseñanza de las materias básicas y clínicas es en lo referente a la enseñanza de medicina preventiva en donde mayor interés se demuestra por adaptar nuevos métodos basados en una nueva filosofía. La idea es ampliar en el estudiante el concepto de salud; darle, mediante actividades extra-murales supervisadas, una visión más clara, elemental pero precoz y concisa de los diferentes niveles en que puede y debe actuar como médico, desde práctica de promoción de la salud hasta la etapa final de rehabilitación cuando los esfuerzos no han podido prevenir la enfermedad ni detener su desarrollo; ir fijando en el estudiante la idea de que su actuación como médico no debe limitarse a sus actividades curativas en el consultorio o en el hospital, sino que tiene responsabilidades mucho mayores para con la sociedad en que actúa y que lo está formando; de esta manera, el profesionista con esta formación será más consciente de los problemas de salud pública que aflijen al pueblo mexicano y consecuentemente estará mejor preparado para afrontar estos problemas, ya sea en la práctica privada o en programas de salud nacionales o internacionales, y podrá cooperar en forma más efectiva en su solución definitiva, con la única finalidad de proporcionar un mayor bienestar a su comunidad.

Mexico is undergoing a phase of increasing concern over medical education and is engaged in a careful analysis of its present status in a sincere attempt to improve teaching methods so as to train a scientifically, morally, and technically better qualified professional who will provide improved services to the community he serves.

This paper will present the highlights and a brief description of some of the work now being developed in medical schools in Mexico.

Basic to the medical teaching reform now going on in Mexico is the concept that the approach to medicine must be humanistic. Medical teaching must be organized around man, viewing him not only in the light of what he represents as an individual, but also as a member of the community in

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which he lives and acts. There are strong reasons that impel Mexico to act in this direction: its socio-economic structure, including people with very wide extremes of basic income, to mention just one.

An obvious factor in this movement to reorganize medical education is the reluctance to introduce, without prior deep analysis and thought, any teaching system that is not in keeping with Mexico's traditions of education, even though such systems might have produced favorable results in other countries. This is an interesting aspect, for it will undoubtedly lead to the evolution of an educational system that is more compatible with Mexico's situation and better adapted to its multifaceted cultural, social, and economic characteristics. The various attempts at reorganization carried out in other parts of the world are followed with great interest by Mexico, and efforts are made to incorporate into the basic nucleus of its own educational programs those aspects of training that have proved advantageous in other countries with ethnic, social, and economic characteristics similar to those of Mexico.

An important step toward strengthening medical training programs in the country was the establishment of the Mexican Association of Schools of Medicine in 1957, after several meetings of directors of the various medical training institutions. The purposes of the Association are "planning, improving, and promoting medical education, the development of research, the establishment of improved systems and methods, the solution of the financial and scientific problems of schools of medicine, and, consequently, the development of medical and biological knowledge in all its varied aspects." The Association has held national meetings periodically and is establishing the pattern for developing schools of medicine by setting down standards and basic outlines from the teaching and administrative points of view.

This year Mexico will have a population of over 33 million inhabitants, and it is estimated that there will be 21,000 physicians—a ratio of 6.2 physicians to every 10,000 inhabitants. Taking into account the fact that countries with greater economic development and better health conditions have a far larger proportion of physicians in relation to a number of inhabitants, one can conclude that Mexico, with its increasing population and large-scale plans of health development, will need to train a considerable number of physicians and to distribute them more adequately.

To meet this need Mexico has at the present time nineteen medical schools, three of them newly established. Most of the nineteen are affiliated with a university, almost all of which receive financial aid from the state or federal governments or both.

Although from the geographic point of view these schools are fairly well distributed throughout the country, the same cannot be said of the student population. Of about 10,500 medical students more than 60 per cent are concentrated in the Mexico City area, and around 50 per cent of all medical students in Mexico attend the School of Medicine of the National University (Mexico City). Both the Government and the National University authorities are aware of the problem caused by this large mass of students and have undertaken steps to solve the situation by promoting the development of other medical schools through financial and technical aid and by discouraging students from areas where there is a medical school from entering the National University.

Primary education in Mexico, which lasts 6 years, is by law both compulsory and free. Secondary education takes 3 years, and the "bachillerato" 2 more, or a total of 5 years. A student may enter the School of Medicine upon completion of the "bachillerato," during which he has presumably received the necessary premedical training, both in the sciences and the humanities, that will prepare him for medical studies. Unfortunately, this is often not the case, and the students' inadequate preparation is one of the greatest obstacles faced by

the medical schools in their reorganization program.

The required period of study to obtain the title of "médico-cirujano" (physician-surgeon) is 6½ years, except in two of the schools where the required period is 7 years. The last 6 months of a medical student's training are devoted to practice in rural areas, and it is this last period that is receiving special attention in the new teaching programs of preventive medicine.

The traditional type of teaching is organized on the basis of the "cátedra" or course taught by a professor, occasionally assisted by other professors or by a recent medical graduate. Thus, for example, basic histology is one cátedra and elementary embryology another. Very frequently there is no coordination between the teaching in one cátedra and the teaching of related subjects, leading to useless repetition and loss of time. Recognition of the inadvisability of this has led to a distinct trend toward organizing departments bringing together several cátedras. A department is understood to be a technical body of professors of related subjects, with teaching, research, service, and administrative responsibilities integrated into a team under the direction of a chief. At present fourteen of the existing nineteen medical schools have already established one or more such teaching departments. Considerable attention is paid to developing close interdepartmental ties.

At the preclinical level greater importance is being given to practical work with active participation by the students in laboratory activities so as to train them in induction and deduction, discipline, and method. It is hoped thus to establish a solid foundation for applying the scientific methods that the physician will have to continue to utilize throughout his entire career.

Increased utilization of personnel exclusively devoted to teaching preclinical subjects is not only raising the level of teaching, but is also increasing research activities considerably. At present ten of the medical schools employ some full-time personnel for purposes of both teaching and investigation.

In clinical teaching emphasis is turning to bedside training of small groups of not more than five or six students under one instructor. This method has been successfully tested, even at the Medical School of the National University, despite its large student population. It is done there by means of a work plan whereby select groups of students receive supervised instruction at several Mexico City hospitals according to the "block" system. This experiment, conducted by the National University, has apparently been so successful, according to a recently made preliminary evaluation, that it will be expanded. The University authorities' interest has been supported by the enthusiastic cooperation of the faculty and the students' eager acceptance of the innovation.

There is a certain reluctance to assign full-time personnel to clinical subjects. Mexico is, however, in a very favorable position for such a development. The great expansion of governmental programs in the field of social security, including extensive hospital care on the one hand, and the medical schools' intention to utilize these great clinical facilities, on the other, will no doubt bring about many more positions for personnel exclusively devoted to hospital functions, both in teaching and in research. The consequence will be an improvement in carrying out both academic and medical care functions. There will be increased prestige to physicians who work in these activities, which in turn will strengthen the public's confidence in hospital care. This tendency will also facilitate the implementation of a system of both training and practice in integral medical care that will include both the well and the ill individual.

Medical research activities in the country are increasing day by day. Mexico has had research centers of international renown for some time. Among these may be mentioned the National Institute of Cardiology, the Children's Hospital, and the Hospital of Nutritional Diseases. While these institutions conduct excellent research and give

a high quality of medical care, they also contribute considerably to medical teaching, particularly postgraduate training. The physicians trained at these and other Mexican centers, and those who are returning in ever increasing numbers to Mexico after training abroad, will make up the nucleus that will have the greatest responsibility for training the future generations of Mexican physicians.

However, it is in the field of teaching of preventive medicine that the greatest interest is being shown for adapting new methods that are based on a new philosophy—development in the student of a new concept of health. By means of supervised extramural activities, the student is given, early in his career, a clear and concise basic understanding of the various levels at which he can and must act as a physician, beginning with health promotion, through curative medicine to the stage of rehabilitation, for those cases where efforts were not able to prevent the disease or to check its development. Attempts are made to inculcate in the student the idea that his activities as a physician should not be limited to curative aspects in the clinic or hospital, but that he has a much greater responsibility to the society in which he lives and which is contributing for his training. A professional thus trained will have increased awareness of the public health problems that afflict the people of Mexico, and consequently he will be better prepared to face those problems, whether in private practice or in national or international health programs.

In conclusion, we might state that the thesis of Mexican educators is to insist on the humanistic approach of the profession during the training years of the future physician, to insist on his thorough knowledge of the individual from the physical, psychic, and socio-economic views; to make the teaching staff conscious of the fact that its function is not just to teach subjects but to prepare a professional in such manner that he will have a fuller understanding of his fellowman and his problems. Such an understanding may help the good physician really to serve his community and its citizens and in this way to find his greatest satisfaction.

Consistency of Performance at Examinations

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Goldstein (4) has questioned recently whether it is possible, let alone desirable, to rank students in several grades on the basis of their performance at examinations. In his opinion, examinations "should be regarded primarily as exercises for the student's benefit. . . . They must also serve as screening instruments for enforcing minimum standards." Goldstein advocates the employment of only two grades, *satisfactory* and *unsatisfactory*.

My comments on this proposal are made in the light of examination results obtained at Otago University Medical School, where I teach the same subject (pharmacology) as Professor Goldstein. I began collecting the information given in this paper because I wished to discover why various students did not make satisfactory progress in pharmacology. Discussions with the students concerned gave the impression that some of them failed because of misdirected effort rather than through laziness or lack of intelligence. It occurred to me that, if I could discover at an early stage of the course which students were liable to fail, I might be able to help them by appropriate measures. I therefore became interested in assessing how students would fare at the major examination in pharmacology, not only on the basis of their performance at minor ("Term") examinations in the subject, but also on the basis of their performance at other subjects.

MAJOR EXAMINATIONS AT OTAGO

The "Intermediate Examination."—At Otago University the medical course follows the British pattern. Students have to spend at least 1 year at university before they can enter the medical school, the minimum academic qualification being a pass in the "Intermediate Examination." The subjects for this are Zoology, Physics, and Chemistry. Since the number of students wanting to enter the medical school has increased greatly the last 20 years, there has usually been strong competition for the 120 places available annually. Scraping through the Intermediate Examination is unlikely to get a student into the medical school unless he comes into a favored category (e.g., war veteran, Polynesian). There have been years when it would appear that only the "cream" of the pre-medical students, as judged by performance at the Intermediate Examination, had gained entry to the medical school. However, performance at the Intermediate Examination has not proved a fair test of academic ability, partly because there is no regulation to prevent a mediocre student from eventually making the grade by sitting the examination repeatedly. In any case it may be doubted whether an examination of this type provides the best criterion for determining entry to the medical school.

The "First Year Examination."—Of the 120 students accepted annually about 95–100 complete the course. Thus, the "wastage" is about 20 per cent. Much of this occurs early in the course, since there is a regulation which enables the Faculty to exclude permanently from the medical course any student who fails within two attempts to pass an examination in Anatomy and in Physiology & Biochemistry held at the end of the first year of the medical course

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proper. Repeated failure at any of the examinations held subsequently does not carry the risk of permanent exclusion. Hence these examinations are less dreaded by students than is the "First Year" examination.

The "Professional Examinations."—There are several of these, namely:

The *First Professional Examination*, which is held at the end of the fifth term of the medical course proper and for which the subjects are Physiology and Biochemistry, and Anatomy.

The *Second Professional Examination*, which is held at the end of the third year of the medical course and for which the subjects are Pathology, Medical Microbiology, and Pharmacology and Therapeutics.

The *Third Professional Examination* (*First Section*), which is held at the end of the fourth year of the medical course and for which the subjects are Preventive Medicine and Medical Jurisprudence.

The *Third Professional Examination* (*Second Section*), which is held at the end of the fifth (and final) year of the medical course and for which the subjects are Medicine, Surgery, and Obstetrics and Gynecology.

At a Professional Examination there is always a *viva voce* as well as a written examination in each subject; there may also be practical examinations. The final result is entered in the school records as a percentage. However, students are not told these percentages; they are merely given grades. A student scoring less than 50 per cent fails the examination in that subject. If he fails in only one subject of the First Year or of a Professional examination, he will generally be allowed to sit a "Special" examination in the subject after the summer vacation. This gives him a chance to stay with his class. If he fails in more than one subject, a student must repeat the year's work.

EXAMINATION DATA

Performance at the Second Professional Examination was studied during the period 1950–1958. A total of 943 students sat the examination in all three subjects during this 9-year period. However, not all of these had pursued a course which enabled their performance at examinations before the Second Professional Examination to be compared fairly with that of the average student. For example, several were refugee medical graduates who were required to take only the latter part of the medical course at Otago in order to obtain a registrable medical qualification. The number finally considered for the 9-year period was 910.

Grading according to performance at previous major examinations.—The students of each year were divided into five groups. Group A consisted of the twenty who obtained the highest aggregate marks in the First Year and First Professional examinations (the subjects for both these examinations being Anatomy, and Physiology and Biochemistry). Group B consisted of those students whose aggregate marks for the First Year and First Professional examinations put them in the next twenty after Group A. Group C consisted of those students whose aggregate marks were less than those of students in Groups A and B but who had not done so badly as to be compelled to repeat a year of the medical course. Group D consisted of those students who were sitting the Second Professional Examination for the first time but who had already been compelled to repeat at least 1 year of the medical course. Group E consisted of those students who had been compelled to repeat the third year of the course; members of this group would have already attempted to pass the Second Professional Examination.

For the years 1950–1958 the numbers of those in Groups D and E combined were 20, 34, 22, 27, 23, 34, 32, 30, and 35, respectively. Thus, approximately one-quarter of each class consisted of students who had been compelled to repeat at least one whole academic year since the beginning of their medical studies.

Performance according to grouping.—Tables 1 and 2 show how the members of these groups fared at the Second Professional Examination. There is an obvious gradation from Group A to Group D. Whereas only thirteen failures out of a possible 540

TABLE 1

Performance of Students at Second Professional Examination in Relation to Their Performance at Previous Major Examinations*

Group	No. failures in years 1950–58, respectively	Proportion	Percentage
Pharmacology & Therapeutics			
A	1, 0, 0, 0, 1, 0, 0, 0, 0	2/180	1.1
B	2, 0, 0, 0, 1, 1, 1, 3, 0	8/180	4.4
C	6, 4, 6, 5, 4, 3, 5, 7, 3	43/293	14.7
D	2, 3, 1, 3, 0, 3, 11, 3, 3	29/161	18.0
E	3, 1, 0, 0, 1, 0, 0, 5, 3	13/96	13.5
Medical Microbiology			
A	0, 0, 0, 0, 0, 0, 1, 2, 1	4/180	2.2
B	5, 0, 0, 0, 1, 3, 1, 2, 0	12/180	6.6
C	6, 1, 2, 3, 5, 4, 3, 4, 6	34/293	11.6
D	4, 2, 0, 1, 3, 8, 7, 1, 5	31/161	19.0
E	2, 1, 0, 0, 0, 0, 1, 2, 0	6/96	6.3
Pathology			
A	1, 0, 2, 0, 1, 1, 0, 2, 0	7/180	3.9
B	5, 1, 0, 1, 2, 1, 2, 4, 1	17/180	9.4
C	10, 3, 6, 7, 13, 13, 4, 5, 6	67/293	22.8
D	4, 6, 3, 5, 8, 9, 9, 3, 9	56/161	34.8
E	3, 0, 0, 0, 0, 1, 2, 1, 1	10/96	10.4

* For explanation of grouping see text.

TABLE 2

Performance of Students at Second Professional Examination in Relation to Their Performance at Previous Major Examinations

Group*	Percentage in group scoring marks in the range:					
	Below 50	50†	51–55	56–60	61–70	Above 70
Pharmacology & Therapeutics						
A	1	2	11	37	39	10
B	4	10	22	43	20	1
C	14	8	37	29	11	1
D	18	21	32	23	6	0
E	16	19	30	27	8	0
Medical Microbiology						
A	1	2	10	26	53	8
B	7	5	23	32	32	1
C	11	14	28	29	18	0
D	20	15	27	23	15	0
E	6	27	24	21	22	0
Pathology						
A	3	7	30	35	25	0
B	9	11	36	32	12	0
C	21	15	33	24	7	0
D	31	18	32	16	3	0
E	12	22	53	10	3	0

* For explanation of ranking of students see text.

† This mark has been singled out as it generally indicates that the examiners were in doubt whether to pass the student.

were noted for Group A, 116 failures out of a possible 483 were noted for Group D. Hence the failure rate for Group D is almost exactly 10 times that for Group A. The failure rate for Group E is substantially less than that for Group D, but it is still sufficiently high to deserve note—students of this group had repeated the year's work and might have been expected to do much better in their second attempt to pass the examination. As may be seen from Table 2, few members of Group E obtained impressive marks. When the groups are compared on the basis of the proportions obtaining high marks, the maximum contrast is again provided by Groups A and D. Thus, whereas members of Group A obtained marks of 60 or more in nearly half the examinations which they sat, members of Groups B, C, D, and E reached this level of performance in only 22, 12, 8, and 10 per cent of examinations, respectively. Marks of 70 and higher were obtained almost exclusively by members of Group A.

There was seldom a striking disparity between a student's performance at one subject of the Second Professional Examination and his performance at the other two subjects. As may be seen from Table 3, hardly any of those who failed in one subject did well at the other two subjects of the examination; in fact, more than one third of them failed in at least one other subject. Likewise, almost all of those who were among the top twelve for the year in a particular subject scored reasonably high marks in the other two subjects. Of the 228 students coming into this category during the period 1950–1958, 52 were in "top twelve" groups for two subjects, and 22 were in "top twelve" groups for all three subjects.

Examination of the marks obtained in Anatomy and in Physiology and Biochemistry revealed a similar state of affairs. A student's grading in the one subject was seldom very different from his grading in the other. Typical results are shown in Table 4. It would have made little difference to the accuracy of the prediction whether performance at Pharmacology and Therapeutics had been assessed on the basis of performance at Anatomy or on the basis of performance at Physiology and Biochemistry. As might be expected, averaging the results of four examinations (to get the groups referred to in Tables 1 and 2) improved the accuracy of the assessment.

TABLE 3

PERFORMANCE AT OTHER TWO SUBJECTS OF THE SECOND PROFESSIONAL EXAMINATION

Those students who failed in Pharmacology and Therapeutics, Medical Microbiology, or Pathology; the top twelve students for each year over the period 1950–1958 in each of these subjects

	P & T	M.M.	Path	P & T	II M.M.	Path
Total number considered:	95	87	157	108	108	108
Number of these who:						
failed in other 2 subjects	19	19	19	0	0	0
failed in 1 other subject	34	32	40	4	2	1
had average* of 50–51%	15	6	15	1	1	1
" " " 52–55%	19	23	48	16	15	7
" " " 56–60%	5	5	29	35	33	37
" " " 61–64%	0	2	6	32	43	35
" " " 65–69%	0	0	0	18	12	19
" " " 70–75%	0	0	0	2	2	8

* For other two subjects of the examination. Thus, fifteen of the students who failed in Pathology got no more than 50–51 per cent when their marks in Medical Microbiology and Pharmacology and Therapeutics were averaged.

Prediction of performance on the basis of "Term" examination results.—Until recently the only examination in Pharmacology which medical students at Otago were required to sit was the one which forms part of the Second Professional Examination. This examination on "Pharmacology and Therapeutics" includes questions on medicine—

much of the teaching of pharmacology at Otago is integrated with that of systematic medicine.

A need for minor ("Term") examinations became evident when rearrangement of the medical course spread out the teaching of pharmacology over four terms. Apart from providing a stimulus for the lazier students, Term examinations have given the class as a whole an indication of what they are expected to know, since each examination is followed by an exhibition of good and bad answers, examiners' comments, and "howlers." Those students who did badly at a Term examination have been interviewed shortly afterwards. It has usually been possible to ascertain from the interview, if it were not already clear from the student's paper, why he failed the examination.

Table 5 shows that, while a student's chances of passing the final examination could be estimated fairly well on the basis of his Term examination marks, these marks did not provide a more reliable index than those obtained in the First Year and First Professional examinations. There are probably at least two reasons for this.

Incentive.—The first of the two Term examinations is held at a time when many of the students are inclined to slack. At the end of the preceding term they have had to make a major effort to pass the First Professional Examination; they know that the next tough hurdle is a full year off; consequently, they are tempted to postpone the intensive study of pharmacology until after the long summer vacation. By the time that the other Term examination is held, the Second Professional Examination has loomed uncomfortably close. Most students are pleased to sit the "Third Term" examination in pharmacology because they can learn from the result whether their preparation for the Professional examination is likely to be adequate. It is therefore not surprising that performance at the Professional examination could be assessed more reliably from the results of the Third Term examination than from the results of the First Term

TABLE 4

COMPARISON OF THE PERFORMANCE AT *EITHER* DIFFERENT EXAMINATIONS IN THE ONE SUBJECT *OR* DIFFERENT SUBJECTS AT THE ONE EXAMINATION OF THE STUDENTS OF A TYPICAL YEAR*

I

	1a	2a	3a	4a
1A	11	5	3	1
2A	4	7	3	6
3A	2	6	5	7
4A	3	2	9	17

	1p	2p	3p	4p
1P	10	7	2	1
2P	5	6	7	2
3P	5	2	4	9
4P	0	5	8	18

II

	1P	2P	3P	4P
1A	13	4	2	1
2A	3	7	6	4
3A	3	5	3	9
4A	1	4	8	19

	1p	2p	3p	4p
1a	12	3	4	1
2a	6	6	5	3
3a	3	6	8	3
4a	0	4	3	12

* Students have been grouped according to the marks obtained at (1A–4A) the First Year Examination in Anatomy, (1a–4a) the First Professional Examination in Anatomy, (1P–4P) the First Year Examination in Physiology and Biochemistry, and (1p–4p) the First Professional Examination in Physiology and Biochemistry. The top twenty in each examination constitute group 1, the next twenty group 2, the next twenty group 3, and the remainder group 4. The horizontal columns show how members of each group fared at other examinations. It will be seen that eleven of the twenty members of group 1A came into group 1a, 5 into group 2a, thirteen into group 1P, and so on.

examination. Typical results are given in Table 6.

Type of examination.—Table 6 shows also that the correlation between marks obtained at a Term examination and those obtained at the Professional examination was not nearly so good when the Term examination was of the conventional type (three or four questions calling for long "essay" answers) as when it consisted of numerous short-answer questions. Two types of "short answer" examination were tried. In "script-correcting" examinations marks are obtained by improving the script provided by (*a*) changing or deleting words or phrases which are unsuitable or wrong in relation to the context of the paragraph in which they occur, and (*b*) filling in blank spaces with the appropriate information. The following is the unimproved portion of such a script:

TABLE 5

PERFORMANCE AT SECOND PROFESSIONAL EXAMINATION IN PHARMACOLOGY AND THERAPEUTICS DURING THE PERIOD 1956–58

Students graded (1–5) according to their aggregate marks in term examinations in Pharmacology, (A–E) according to their aggregate marks in the first year and first professional examination, and (I–V) according to their aggregate marks in the two sets of examinations combined and given equal weight.

	Failed	50	51–55	56–60	61–70	71–81
1*	0	1	6	23	24	6
2	3	10	6	18	18	5
3	4	14	13	17	11	1
M4	14	12	21	9	4	0
5	24	21	10	4	4	0
A	0	1	4	16	29	10
B	5	11	7	18	18	1
C	9	7	22	16	5	1
D	8	16	11	13	12	0
E	25	25	13	8	2	0
I	0	0	3	16	32	9
II	2	8	8	22	17	3
III	3	14	16	18	9	0
IV	17	15	14	8	6	0
V	24	21	14	5	2	0

* Group 1 (or Group A or Group I) contains the top twenty students for each of the three years under consideration (60 students in all), Group 2 (or Group B or Group II) the next twenty, and so on.

Lignocaine ("Xylocaine") is an efficient, if not very powerful local anesthetic when given by injection, but it has only a feeble action when applied to mucous membranes due to poor absorption. The comparative safety of lignocaine depends on its slow absorption and its inactivation by a tissue oxidase. The corresponding amide is broken down less rapidly *in vivo* and has therefore largely replaced lignocaine in the treatment of such cardiac disorders as ..... where it exerts a beneficial action by shortening the refractory period of the myocardium and reducing its excitability.

TABLE 6

PERFORMANCE AT SECOND PROFESSIONAL EXAMINATION IN PHARMACOLOGY AND THERAPEUTICS OF STUDENTS GRADED ACCORDING TO THE MARKS OBTAINED AT TERM EXAMINATIONS OF DIFFERENT TYPES

Exam	Second professional					
	Grade*	1	2	3	4	5
1955a†	1	6	4	5	3	2
	2	2	5	3	5	3
	3	5	3	5	5	2
	4	2	7	6	2	33
	5	4	1	0	6	6
1958a‡	1	11	4	4	1	0
	2	3	5	6	3	3
	3	3	7	5	3	2
	4	2	3	1	8	6
	5	0	1	2	3	11
1958b§	1	14	4	2	0	0
	2	5	6	4	2	3
	3	0	4	7	4	5
	4	1	2	3	9	5
	5	0	4	3	5	11

* The top twenty in the examination constitute grade 1, the next twenty constitute grade 2, and so on.

† First-term examination with essay answers.

‡ First-term examination with short answers.

§ Third-term examination with short answers.

Benzocaine ("Anaesthesine") closely resembles cocaine. It is readily absorbed from mucous membranes. It can be used for infiltration anesthesia but is not recommended for this on account of the brevity of its action.

Amethocaine ("Decicaine") is a water-insoluble local anesthetic. It may be dusted on to mucous surfaces to relieve itching, irritation, and pain.

Toxic doses of typical local anesthetics are liable to produce ..... due to stimulation of the cortex, followed by paralysis of ..... and death. Inflammation will tend to intensify

the effects of such drugs as procaine by increasing the degree of ionization of the amine.

The other type of "short-answer" examination consisted of ten questions, most of which contained five or ten parts. For example, students might have to state briefly for each of a diversity of drugs: the mode of action; therapeutic indications and contraindications; warning signs of overdosage; undesirable complications that may result from the repeated administration of therapeutic doses; usual routes of administration; or how the body gets rid of the drug. Other questions might take such forms as: Classify the drugs used to. . . . What are the principal effects of —— on the following bodily systems. . . . Summarize advantages and disadvantages of. . . . List the factors which you would consider in evaluating a new drug said to. . . . These questions were put on cyclostyled sheets with so little space for the corresponding answers that students were compelled to be succinct. Whichever form of "short-answer" examination was employed, the marks gave a much greater spread than was obtained with an "essay" examination, and the placings were more in accord with those obtained at the Professional examination.

TABLE 7

PERFORMANCE AT THE ESSAY SECTION OF THE SECOND PROFESSIONAL EXAMINATION IN PHARMACOLOGY AND THERAPEUTICS OF STUDENTS GRADED ACCORDING TO THE MARKS OBTAINED IN ANSWERING THE QUESTIONNAIRE SECTION

Group*	1	2	3	4	5
A	13	11	10	4	2
B	12	7	10	6	5
C	10	9	6	6	9
D	4	9	7	10	10
E	1	4	7	13	22

* Group A contains the top twenty students for each of 2 years as judged by the marks obtained in answering the questionnaire, Group B contains the next twenty students for each year, and so on. Groups 1–5 are based similarly on the marks obtained in the essay part of the examination.

A more direct comparison between the two types of examination has been obtained at the Professional examination. For the last 2 years the written portion of the examination in Pharmacology and Therapeutics has consisted of two parts, each marked out of 50, *viz.* (*a*) two essays and (*b*) a battery of 100 questions, each to be answered (or left, if the student prefers to avoid the risk of being penalized for a wrong answer) by striking out either *True* or *False*. As can be seen from Table 7, the correlation between the marks obtained for the answers to the questionnaire and those obtained for the essay section of the examination was not very good. There was sometimes a striking disparity between the two marks. A comparison of these marks with those obtained at the *viva voce* examination and for the whole examination indicated that more reliance could be placed on the questionnaire mark than on the essay mark. A low mark for the questionnaire almost invariably indicated that the student would fare badly at the whole examination.

TABLE 8

PERFORMANCE AT "FINALS" OF THOSE STUDENTS WHO, AS JUDGED BY THEIR PERFORMANCE AT THE SECOND PROFESSIONAL EXAMINATION, CONSTITUTED THE TOP AND BOTTOM PORTIONS OF THEIR CLASSES

Av. mark at "Finals" (in Medicine, Surgery, and Obstetrics, and Gynecology)	"Top 12" groups for the years 1950–1955 (72 in all)	"Bottom 12" groups for the same six classes
70 or more	7	0
65–69	23	0
60–64	29	8
55–59	13	45
50–54	0	10
Failed	0	9

Performance at "Finals."—It may be argued plausibly that success at the Third Professional Examination (Second Section) will depend to a large extent upon possession of "clinical acumen," since three of the six examinations which constitute the "Finals" are clinical examinations. I have therefore compared the performance at Finals of those students who, at the time of the Second Professional Examination, made up the top and bottom portions, respectively,

of each class for the period under discussion. The results of this comparison are shown in Table 8. It can be seen that all members of the "top twelve" groups got through Finals comfortably and that many of them scored high marks. Members of the "bottom twelve" groups fared much less impressively. A number of them failed to pass at their first attempt, and not one of them got a high average mark. It should be added that almost all members of a "bottom twelve" group sat Finals at least one year later than members of the corresponding "top 12" group.

DISCUSSION

Examiners in the basic medical sciences are occasionally faced with the problem of deciding whether a student who has done badly should be allowed to continue the medical course. If they give the student the benefit of the doubt, then he may continue to flounder, with the result that his withdrawal from the medical course will have been postponed to a stage at which it can entail relatively great hardship. If, on the other hand, they force the student to withdraw from the course, the examiners are left with the uncomfortable suspicion that the student's weakness could have been confined to certain subjects of the curriculum; he might have done much better later on in the course. The results just described give little support to the more optimistic view. At Otago, at any rate, most medical students run remarkably true to form.

What has been measured?—One may well wonder why examiners in different subjects have differed so little in their ranking of students (Tables 2–4, 8). It would seem that the ability which they have tried to measure depends to only a minor extent upon the subject. Perhaps it is largely the ability to memorize with fair understanding much of the contents of a standard textbook! The results shown in Tables 4, 6, and 7 suggest that a student's performance may depend more on the type than on the subject of the examination.

We may get a hint as to what is being measured by considering what examiners in medical subjects are *attempting* to measure. This is probably achievement as distinct from intellectual capacity. The examiners in a particular subject would scarcely regard it as their chief duty to detect those members of the class whose lack of general intelligence should debar them from the practice of medicine; the separation of the sheep from the goats should already have been achieved in large measure by the entrance tests (although these will fall a long way short of being infallible). Rather, it is the main function of the examiners to decide which members of a class have failed to obtain a sufficient knowledge and understanding of a particular subject for this to form an adequate part of the education fitting them for the practice of medicine.

Now the different types of examination that may be employed do not evaluate precisely the same qualities and achievements (2, 6, 7). For example, consider factual recall. A student writing an essay can often gradually recall a large number of facts (many of which may be unimportant or not highly relevant) if he has partly memorized sections of a textbook or of some other source of information. The short-answer type of examination requires the student to produce information out of context; the student must therefore have a better grasp of it. Because this type of examination can be used to cover a much wider field than would a few essay questions, it forces the student to acquire an extensive knowledge of a subject rather than an intensive knowledge of such portions of it as are reckoned by the student to provide suitable material for essay questions. The short-answer examination does not foster the "listmanship virtuosity" which Arnott (1) has deplored recently as a feature of "the new schoolmanship."

I would agree with Arnott that it is unwise to emphasize factual knowledge as opposed to understanding, if only because this results—at least for the time being—in undue reverence for authority both written and spoken; but factual knowledge is sometimes unduly disparaged. Actually, an un-

derstanding of any branch of medicine can hardly exist without relevant factual knowledge. Just as a student who wishes to learn a foreign language must acquire an appropriate vocabulary in addition to grammatical knowledge, so the medical student must learn numerous facts in addition to acquiring "informed and logical attitudes and patterns of thought." Examiners for their part have to test both knowledge and understanding.

As Sinclair (7) and others have pointed out, the marks obtained in essay-type examinations do not correlate well with those obtained in tests designed to assess intelligence. "With a little bit of luck" the dullard may obtain quite good marks in essay-type examinations, for chance can strongly affect the issue in two ways. First, the sample of the student's knowledge obtained by essay questions may be far from representative of his general knowledge of the subject. Students are well aware that examiners have seldom a wide choice of reasonable essay questions. Consequently, the student is strongly tempted to "spot" questions if he knows that the examination will be of the essay type. Low cunning may prove far more rewarding than extensive knowledge. Secondly, the mark awarded an essay is a notoriously variable quantity (4, 5, 7).

Essay-type examinations test several abilities apart from factual recall, e.g., the ability to select relevant facts, the ability to give information clearly and in logical sequence. However, at least some of these undeniably valuable qualities of mind can be assessed through the use of examinations of other types. Thus, short-answer questions can be of such a form that the student is required to set down a framework of ideas or facts. The very compression entailed makes it easy for the examiner to see whether the student has grasped essential features. Because of the flexibility of short-answer examinations, the student is discouraged from memorizing stock answers; he has to apply his knowledge more often. Hence, differences in intelligence, as distinct from knowledge, tend to be shown up more clearly by short answer than by essay examinations. I have noticed this particularly when employing the "script-correcting" form of examination. I got the impression that the plodder was heavily penalized by this form of examination.

Value of grading.—Before we consider whether grading is desirable, we have to consider whether it is possible. If attempts to rank students result in numerous major discrepancies, such as were observed by Goldstein (4), then grading is plainly fallacious in these circumstances. Under the conditions which I have described, however, major discrepancies have been relatively few. Still, consistency in the marking is not in itself justification for grading, for the quality assessed may not be closely related to what one wants to measure. To grade fairly, one has to insure that the tests imposed will evaluate the appropriate accomplishments. Examiners are bound to rank students differently if some are concerned mainly with evaluating factual knowledge, others with evaluating understanding of a subject. The significance of the grading lies in what has been principally assessed, e.g., industriousness, intelligence, promise of becoming a good doctor—qualities which may not be closely related.

At this point it is important to distinguish between (*a*) grading for the benefit of the student and (*b*) grading for the benefit of the teaching staff.

The student wishes to know how he is progressing, in particular whether his performance in a given subject is satisfactory or unsatisfactory. Unlike Goldstein, I believe in making a further division for the student's benefit. In my opinion, the student who has performed much better than the average should be given the satisfaction of being told this. Surely it is as important to encourage excellence as to insure minimum standards. The atmosphere of a medical school should not belie its claim to be a center of higher learning. I find it strange to see an American referring to "unhealthy competitiveness." However, while I favor

three grades rather than two, I would agree with Goldstein that the division of students into five grades or even more is generally unwarranted.

A grading system which is satisfactory from the student's standpoint may not be satisfactory from the teacher's. For example, the teacher may be interested in promise as distinct from accomplishment.

As already mentioned, I became interested in performance at examinations because I wished to discover at an early stage of the pharmacology course which students were liable to fail unless they received special assistance. Taken alone, the results of the First Term examination did not prove very useful; but when these were considered along with the student's marks for the First Year and First Professional examinations it was usually possible to classify the student fairly well. If he had done badly not only in the Term examination in pharmacology but also at earlier examinations in other subjects, then the outlook was depressing. If, however, he had done badly at the Term examination but had passed the other examinations comfortably, then it could be assumed that his bad start in pharmacology was not due to lack of academic ability. An interview after the examination often provided a satisfactory answer. Usually it was "lack of incentive" (for reasons already given). In some instances temporary personal troubles were found responsible for lack of progress. Yet other students were found to be the victims of poor study methods. If the cause of failure could be discovered, remedial action could usually be suggested.

The other students in whom I have been particularly interested are those whose performance at pharmacology examinations is well above the average. It has become clear that most of these students do consistently well at examinations irrespective of the subject. If performance is noted over a series of examinations (the results of a single examination are less trustworthy), then this top group can be identified without much difficulty. Of course, members of this group may not constitute the real intellectual cream of the class, for the only ability which they have been shown to possess to a high degree is that of being able to pass conventional examinations. However, it is possible to test these students in other ways, e.g., by enabling them to try their hand at research at an early stage. If their intellectual caliber appears to be distinctly greater than that of the average student, then they deserve appropriate instruction. Such students are often the victims of a "convoy" system of education; their rate of advance is tied to that of the duller members of the class. At Otago it has been found profitable in teaching clinical medicine to arrange the students in tutorial groups according to academic ability as shown earlier in the course. As would be expected from the data given in this paper, members of the top groups progress much faster than those of the bottom groups.

Teaching by examination.—Cynics often refer to students "who can regurgitate a mass of information but who digest very little of it." However, it may not be the teaching which is to blame for such students; it could be the examining or even the entrance policy. As long as examinations bulk large in the life of the medical student, his approach to a particular subject will be influenced more by what he thinks he is liable to be asked at examination time than by the content of lectures or textbooks. Bad examinations can subvert good teaching.

One of my chief problems as a teacher has been to direct students' reading along profitable lines. Since at Otago much of the teaching of pharmacology is integrated with that of therapeutics and systematic medicine, students there have not found it easy to use standard textbooks. I soon noticed that if a student did not come regularly to lectures (attendance at which is optional), he was apt to cram information from textbooks without obtaining much understanding of the subject matter. To help those students who were liable to do badly through misdirected effort, I have found it desirable (*a*)

to provide students with detailed study guides and (*b*) to emphasize what I expect students to learn by displaying after each Term examination, with suitable comments, various good and bad answers.

Since I have indicated elsewhere (3) what I believe students should learn about drugs, I need not elaborate my views here. All that I would add is that the student can be greatly helped in his endeavor to obtain a useful knowledge of drug-therapy without undue effort by the provision of suitable study guides. For example, many of the drugs whose properties are described at length in standard textbooks have been outmoded. A student can be spared much unnecessary cramming by being given a list of drugs that indicates which drugs are of major importance, which deserve some attention, and (most important) which can be justifiably ignored. He can be helped even more by being given lists of questions, of which the following are typical:

> What do you know about the mechanism of vomiting? Which are the chief emetics? How do they act? Why is apomorphine a dangerous drug in inexperienced hands? How would you treat acute food or drug poisoning? Which are the more important antemetics? Are all these good for treating motion sickness? When vomiting is due to other causes, what measures should be considered? What are the chief properties of chlorpromazine?

Finding answers to such questions helps students to make good use of their textbooks. Moreover, if the questions as a whole are designed to cover the syllabus, attempting to answer them without the aid of a textbook or lecture notes gives the student a fair idea of his progress. If the questions in different sections are made to overlap to a considerable extent, then the student's knowledge is reinforced with "cross-links." I have found that the labor of preparing study guides has been amply repaid by improved performance on the part of many students. In fact, insofar as they help the student to teach himself, they save the teacher's time in the long run.

SUMMARY

The performance of 910 students who sat the "Second Professional Examination" (subjects: Pharmacology and Therapeutics, Medical Microbiology, Pathology) at Otago University Medical School during the period 1950–1958 has been compared with their performance at certain other examinations.

Few of the students who performed badly at the two earlier major examinations of the medical course (both in Anatomy, and Physiology and Biochemistry) performed well at the Second Professional Examination; a substantial proportion of them failed in at least one subject and only one student obtained a high mark in any subject. Nearly all the high marks at the Second Professional Examination were obtained by those students who had gained high aggregate marks at the earlier major examinations. Hardly any students of this group failed a subject of the Second Professional Examination.

There was a similar disparity at "Finals" (which consist of three clinical examinations as well as three written papers in Medicine, Surgery, and Obstetrics and Gynecology, respectively, and might therefore be expected to measure "clinical acumen" as well as other qualities) between the performance of those students who, as judged by their aggregate marks for the Second Professional Examination, constituted the top of the class and the performance of those others who, by the same criterion, constituted the bottom. Whereas not one student of the "top twelve" groups for a 6-year period fared badly at Finals, not one of the corresponding "bottom twelve" groups came to the fore.

The order in which students have been ranked varied more when they sat different types of examination in the one subject (e.g., essay examinations as distinct from short answer examinations) than when they sat the same type of examination in different subjects.

Some of the implications of these findings have been discussed.

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Foreign Doctors in Sweden

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SAMMANFATTNING

Genom den snabba expansionen av alla grenar av hälso- och sjukvården i Sverige efter det andra världskriget uppstod en kännbar läkarbrist. Många vid kontinentala och skandinaviska lärosäten utbildade läkare inflyttade. Artikeln beskriver kortfattat, hur man i Sverige sökt bedöma dessa läkares medicinska kvalifikationer och vilka åtgärder som vidtagits för att ge dem nödvändig tilläggsutbildning.

Antalet läkare i Sverige har ökat relativt hastigt och utgjorde den 31/12 1958 6.602, vilket på en befolkning av 7.436.000 blir 1.125 personer per läkare eller ungefär 885 läkare på 1.000.000 människor. Antalet läkare i landet beräknas så småningom öka relativt kraftigt. Emellertid tyder uppskattningar av läkarbehovet under 1960—talet på att en kännbar läkarbrist kommer att bestå under detta decennium, och beslut har därför fattats att under åren 1962–1967 öka intagningen av medicine studerande med 50 per år till ungefär 450.

Den tidigare immigrationen av utländska läkare till Sverige utgjordes huvudsakligen av flyktingar från de baltiska staterna och från ett antal centraleuropeiska länder (mer än 200 läkare). Enligt riksdagsbeslut 1946 sattes för dessa läkare det villkoret, att de skulle fullgöra vissa tentamina samt en ett-årig tjänstgöring på svenska sjukhus för att vinna behörighet att utöva läkarkonsten. Under 1950—talet överfördes genom en överenskommelse mellan de svenska och österrikiska regeringarna c:a 100 österrikiska läkare till Sverige. Dessa läkaretsom i Österrike fullgjort turnustjänstgöring eller 2–3 års utbildning som specialist, får efter språkträning och ett års tjänstgöring på svenska sjukhus generell behörighet. Dessutom kom utländska läkare individuellt till Sverige för längre eller kortare tids arbete. Villkor för deras efterutbildning har föreslagits av en kommitté under ordförandeskap av först landshövding F. Thunborg och senare av mig. C:a 90 av dem får därigenom generell behörighet utan ytterligare utbildning efter huvudsakligen olika sjukhustjänstgöringar.

I framtiden måste man även räkna med att läkare från utländska medicinska utbildningsanstalter kommer att söka sig till Sverige. För läkare utbildade i övriga skandinaviska länder föreligger inga svårigheter. En interskandinavisk parlamentarisk kommitté utarbetar ett förslag om en gemensam arbetsmarknad för läkare i Norden, varigenom de skandinaviska ländernas läkare avses få rätt att arbeta på samma villkor i samtliga länder. Detta förslag vinner sannolikt de olika regeringarnas anslutning. För läkare från övriga länder kommer enligt den tidigare nämnda kommitténs förslag en granskning att ske, varefter efterutbildning sker antingen genom sjukhustjänstgöringar eller kurser vid universiteten eller en kombination av bådadera. I regel kommer en inledande provtjänstgöring att erfordras. Genom ett sådant system kommer i mån av behov en möjlighet att kunna beredas utländska läkare att även i fortsättningen vinna arbete som läkare i Sverige. Granskningen av alla sådana sökande sker genom medicinalstyrelsens nämnd för utländska läkare, som förelägger dem efterutbildningsvillkor.

During and since World War II the institutions and resources of all types of medical care have been expended very rapidly in Sweden. This is especially the case with hospitals for somatic diseases but also, and in increasing measure, mental hospitals. Following the introduction of a universal, obligatory medical insurance in 1955 a definite increase has occurred in all types of medical care of ambulatory patients, both for general practitioners and specialists. This, as well as an increase in medical educational and research institutions, has caused a definite shortage of doctors. It is seen in many ways. Positions less desirable than others because of psychological, geographical, or economic reasons are difficult or impossible to fill. In more remote areas of the country such as the far North many positions such as district medical officer ("provinsialläkare") are vacant or must be filled provisionally with not fully trained undergraduates. It is difficult or impossible to find doctors willing to serve in mental hospitals. Also in other disciplines with fewer possibilities of a career it is difficult to recruit young men for junior positions.

Because of this situation, many doctors

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graduated in other countries have sought the right to work as physicians in Sweden. Since this situation is not common in a country with a fairly high standard of living, it might be of interest to describe the technics adopted to judge the qualifications of these doctors and the measures taken to train them for medical service in Sweden.

NUMBER OF DOCTORS IN SWEDEN

The shortage of doctors in Sweden exists despite the rapid increase in the number of doctors graduated during the last decades. There is a *numerus clausus* in Sweden, that is, the entrance to medical training is limited. In the beginning of the 1940's there were three medical schools functioning, namely, in Uppsala, Lund, and Stockholm, and in the entire country only a few more than 200 medical students were admitted each year. In 1947 a fourth medical school was opened in Gothenburg, and in 1959 the first students were admitted to the clinical courses of the fifth medical school started in Umeå, a city in northern Sweden. This has increased the numbers of medical students admitted to slightly more than 400 each year. However, an increase of the training institutions causes an increase in the number of doctors in only a very slow way. It might be of interest to give the figures of the number of doctors in Sweden during later years (Table 1).

TABLE 1

NUMBER OF DOCTORS IN SWEDEN

1930	2,400
1940	3,242
1950	4,631
1955	5,508
1958	6,602

Even if the number of doctors has thus increased fairly rapidly during later years, the total number is still relatively low in comparison with the population; 6,600 doctors to a population of 7,436,000 people (Dec. 31, 1958) makes about 1,125 persons for each doctor or about 885 doctors per 1,000,000 people. This is low in comparison with figures in many other countries (cf. Table 2).

Owing to the increased number of medical students, however, the number of doctors in Sweden will slowly increase. According to a recent prognosis the situation will develop as follows if the number of medical students are kept constant at a figure of slightly more than 400 (Table 3).

It is of course extremely difficult to ascertain whether the number of doctors trained at various future times will be sufficient to cover the actual need of doctors at that distant date. Such a prognosis has been made by the Royal Medical Board for the year 1965, and it shows that an appreciable shortage will probably exist at that date if the current development of Swedish health services proceeds according to plans. Lately several expert committees have proposed expansions in various fields of those services, such as the number of general practitioners, the mental hospitals and the highly specialized branches of somatic hospitals. It is felt that these new needs will aggravate the shortage of doctors during the next

TABLE 2

NUMBER OF DOCTORS PER MILLION INHABITANTS IN DIFFERENT COUNTRIES

Country	Year	Doctors per 1,000,000 inhabitants
Austria	1953	1,549
New Zealand	1954	1,333
West Germany	1953	1,332
Soviet Union (USSR)	1954	1,322
USA	1953	1,311
Italy	1951	1,236
Denmark	1953	1,114
Norway	1955	1,060
Canada	1954	1,055
Switzerland	1954	1,020
Japan	1952	991
Australia	1952	983
France	1953	885
England and Wales	1953	864
Sweden	1955	786
Venezuela	1953	540
Finland	1955	560
Brazil	1950	333
India	1954	170
Pakistan	1954	74

10 years even more than could be foreseen earlier. To remedy this situation to some degree, the Government has proposed to the Parliament now in session that the number of medical students admitted should be increased, with a little more than 50 each year up to around 450 during the years 1962–67, and that a corresponding number of clinical training places should be increased immediately. To fill these clinical training places during the next 4 years, graduates from continental medical schools will be accepted in Sweden. To determine how many training places will be needed after 1967, a prognosis of the development of the Swedish health services for the decade 1970–80 will be made as soon as possible.

TABLE 3

FUTURE NUMBER OF DOCTORS IN SWEDEN

Year	Total population	Total number of doctors	Number of inhabitants per doctor	Doctors per 1,000,000 inhabitants
1970	7,630,000	9,200	830	1,205
1980	7,910,000	11,200	705	1,415
1990	8,100,000	12,900	630	1,590

EARLIER IMMIGRATION OF FOREIGN DOCTORS INTO SWEDEN

The first immigration of foreign doctors into Sweden of any consequence came during and immediately after the second world war. During these years great numbers of refugees arrived in Sweden mainly from the Baltic States but also from other countries around the Baltic. Among these refugees were more than 200 doctors, most of them from Estonia, Latvia, and Lithuania, but small numbers also from such countries as Germany, Poland, Czechoslovakia, and Hungary. Initially they were allowed to work among the refugees from their own countries, but soon many of them wanted the possibility of working more permanently in the Swedish health service.

In 1946 the Government put forth a proposal, which was accepted by Parliament, concerning rules under which these doctors might be authorized to work as doctors in Sweden. Under these stipulations they should first work for at least 1 year in a Swedish hospital under at least two different medical heads to prove their suitability for medical work in Sweden. They should then demonstrate in an examination that they knew the various laws, etc., contained in what is in Sweden called "state medicine" ("statsmedicin") in the same way as is required for Swedish doctors. Those foreign doctors who, in their own country had the right to work as a specialist, must be examined in this subject in Sweden. Those foreign doctors who wanted to work as general practitioners must be examined in internal medicine, surgery, and pediatrics. After these examinations they were allowed to work on approximately the same conditions as Swedish doctors. When they had won Swedish citizenship, they could apply for positions in general practice ("provinsialläkare") and in hospitals. Since then most of the doctors who came to Sweden before 1947 have become authorized under the rule mentioned.

Since the need for an increased number of doctors continued to be great, the Swedish Government decided to make an agreement with the Austrian Government concerning the immigration of a number of Austrian doctors. Such an agreement was signed in 1950, and it was decided that 100 Austrian doctors should under certain conditions be allowed to work in Sweden. According to the agreement these doctors should have graduated from a medical school in Austria and then for 3 years taken the so-called "Turnusdienst" (a postgraduate training required by the Austrian authorities, approximately corresponding to a rotating internship in U.S.A.). The doctor might also have begun and for 2–3 years followed another line of hospital service in Austria, leading

to the title of specialist ("Facharzt"). When these Austrian doctors came to Sweden they had to take a course for one month in the Swedish language which gave a general orientation of Swedish life and especially the organization of health services. After this they had to work for a year in Swedish hospitals. Finally, they had to take a course in state medicine for one month. After this they were authorized for medical work under the same conditions as Swedish doctors. Around 85 Austrian doctors have moved to Sweden under this agreement, first in 1951 and then in 1958.

During all the post-war years foreign doctors have come to Sweden to work for shorter or longer periods in hospitals and in general practice. Some of them have earned the right to work permanently in Sweden under individual Government decisions, but quite a large number of them have continued working under more provisional regulations. This was felt to be less satisfactory, and in 1954 a Royal Committee was set down to work out proposals concerning the procedure necessary to examine the medical qualifications of these doctors and to make it possible for them to become authorized to work permanently in the Swedish health system. This committee was in the beginning led by the Governor, F. Thunborg, and later, after his untimely death, since 1957 by myself. The committee has had to scrutinize closely 200 foreign doctors, among whom could be noted some 45 Hungarian refugee doctors who came to Sweden in 1956 and 1957. Some of these doctors had worked in Sweden for a considerable time, in some cases up to 7 or 8 years. They had a very different medical status, some of them being specialists in their own countries and some being newly graduated when they left for Sweden. Many nationalities were represented among them, and there were some who had graduated in the United States, Great Britain, Ireland, Holland, France, Germany, Austria, Poland, Switzerland, Czechoslovakia, Hungary, Italy, Greece, Jugoslavia, Spain, Israel, Turkey, and China. In a first report the committee proposed that a certain number of these doctors might be authorized for permanent work in Sweden without further training. These were, first, doctors who were trained as specialists in their home country and had worked for more than 1 year in their speciality in Sweden. Second, the same rule could apply also for doctors who had worked more than 3 years in their own country in a broad clinical field, such as internal medicine, surgery, pediatrics, psychiatry, or obstetric-gynecology, and after that more than three years in Swedish hospitals, where part of this service fell in internal medicine, surgery, etc. Third, the same proposal was made for doctors who, without working in hospitals in their own country, had served for more than 4 years in Sweden in general hospital wards or in mental hospitals or as general practitioners. Foreign doctors, who fulfilled the stipulations now mentioned, needed only to show that they knew the Swedish language and had been examined in state medicine to become authorized as doctors in Sweden. Among all the doctors scrutinized by the committee, about 90 were considered to fulfill these requirements.

Through such general decisions and a number of others taken in individual cases by the Government a fairly large number of foreign doctors have attained the right to work permanently in Sweden. Of the 6,600 doctors registered the 31st of December, 1958, about 500 were graduated from foreign medical schools. Other such doctors have a final medical degree in Sweden after having taken a part of the undergraduate courses here. All in all this is probably more than 10 per cent of all the doctors working in Sweden. Of this number something over 100 have been graduated from Scandinavian medical schools.

So far the attention has centered on foreign doctors from countries other than the Scandinavian ones. Naturally, also, doctors from other Scandinavian countries have come to work in the Swedish health services. This has been common in post-war years. Usually these doctors have returned to their

own country after a longer or shorter period in Sweden. In some cases, however, they have preferred to stay permanently in Sweden. The Swedish medical authorities and the Swedish Government have accepted the medical training in other Scandinavian countries as equivalent to the Swedish one. To get authorization in Sweden these doctors have only had to work for a year in Swedish hospitals and to show in an examination in state medicine that they know current laws, etc.

THE FUTURE PROCEDURE FOR THE TRAINING OF FOREIGN DOCTORS FOR MEDICAL WORK IN SWEDEN

Since there is still a shortage of doctors in Sweden and since, in all probability, this shortage will continue for a considerable time, rules must be established on the procedure for examining and training such foreign doctors as may want to work in Sweden in the future. This problem has lately been tackled in two ways.

Traditionally, the other Scandinavian states are looked upon as being very similar to Sweden, and, as has already been mentioned, doctors from these countries have been accepted in Sweden practically without any further training. A common Parliamentary Committee consisting of members from the parliaments of Denmark, Finland, Norway, and Sweden, have been working on a proposition to give legal status to doctors graduated in any one of these countries for work in any other country. These proposals will be put forward to the various Governments this year.

The proposals are based on the idea that a free movement of doctors inside Scandinavia is useful medically and socially and also for teaching and research. It is also stated that graduation from medical schools in the countries named is equivalent and can be accepted without further training by the other countries. Language difficulties exist mainly with Finland, where a large number of the population speak mostly Finnish. It is thought, however, that it will be in the interest of the doctor to acquaint himself with the language of the country where he intends to work, so that special regulations in this respect need not be set down. When a doctor has worked in a hospital or in some other position in one of these countries, this service should be accepted as giving the same merit in all the other countries. The status of the doctor should be the same in his new country, and he should get the same salary, the same pension, etc., as a doctor born and graduated in that country. Since preliminary discussions and decisions in the Scandinavian interparliamentary group has shown that the general feeling is positive to suggestions of the kind mentioned, these proposals will in all probability be accepted by the Scandinavian states. This means that in short time a general Scandinavian market for doctors will be created.

Another group of foreign doctors coming to Sweden will be graduates of medical schools other than Scandinavian ones. In the beginning of this year the Royal Committee mentioned above put forth a proposal which suggests certain rules for the additional training of such doctors who are at present working in Sweden. In principle these doctors, who number about 80 and who have not yet become authorized for permanent work, will have to take additional training before attaining such rights. They will, of course, have to show that they have a mastery of the Swedish language and that they can pass an examination in Swedish state medicine. They will be scrutinized individually to decide what type of additional training and how much they need. Since they are quite different in their medical qualifications, the individual training requirements will be quite different. In some instances only a short hospital training will be required, but in other instances additional training through undergraduate courses in a Swedish medical school will be needed. These individual decisions will be made by a special board, appointed for the purpose of evaluating foreign doctors.

The committee proposals of greatest general interest are probably, however, those

which are concerned with foreign doctors who in the future want to come to Sweden. The committee proposes that the examination board, mentioned above, shall be responsible for decisions concerning the additional training of such doctors. The board will consist of a chairman and three experts, chosen among university teachers in broad clinical specialties. There will also be two other members on the board, one representing the Royal Medical Board, which has to place the foreign doctors in the various hospital services, and one representing the University Chancellor, who has to place the foreign doctor in such graduate courses in medical schools as might be required. In the future no foreign doctor will be allowed to work in Sweden before he has been scrutinized by the examination board.

When the doctor has applied to the board to be permitted to work in Sweden, his merits and training will first be looked into, and it will be provisionally decided whether he should be allowed to work in Sweden at all or not. If it is thought possible to give such a permit, the board immediately has to apprise the foreign doctor of the preliminary decision of the board concerning the time in hospital services or the number of graduate courses which the board finds it necessary for him to pass. If the doctor accepts this training program, he will then be sent out to work in a Swedish hospital for a period of 1 year in about the same way as during a rotating internship in U.S.A. Of this period at least 6 months should be in a ward of internal medicine or surgery. If this training is taken in a satisfactory fashion, the board will tell the foreign doctor what further training is necessary. This may be a greater or lesser part of the undergraduate courses of a medical school or it may be a hospital service of varying length and in different disciplines. The aim of this additional training should be to give the foreign doctor about the same medical education as that required for a Swedish medical undergraduate. The board will also fix a certain time limit within which the training should be finished. When the stipulated requirements have been fulfilled, the foreign doctor will be authorized for work in Sweden. During his time of training the doctor can be given a loan of enough money to enable him to take the training required. The money comes from a fund for the purpose, which is at the disposition of the Royal Medical Board.

These proposals have been accepted by the Government, and the examination board started its work during April of this year. I have been named the first chairman of the new board.

COMMENTS

The severe shortage of doctors existing in Sweden during and after the second world war has created several very difficult problems, one of which is how to deal with the necessary influx of doctors graduated in other countries. Obviously those doctors coming from the closely related Scandinavian countries present no great problem. However, in Sweden it is felt to be very satisfactory that an agreement will probably be reached whereby these doctors will be able to move to the country of their choice without being subjected to further examinations and training. Obviously this depends on the fact that the general culture and the standard of the health services are very similar in all the Scandinavian countries.

The situation is quite different when the foreign doctors come from countries outside of Scandinavia. Also in these cases the Swedish authorities have tried to tackle the problem of additional training in a rather unusual way. In principle it is possible either to rely on extensive examinations before admitting a doctor to medical work in a new country or to study him while he is performing medical work. In Sweden the second method has in general been taken. In the beginning the decisions and regulations were not quite consistent, but in general rather little was required in the way of undergraduate courses or corresponding examinations. In the future both possibilities will be used in the additional training of a foreign doctor. These doctors, if admitted into the country, will

either have to undergo a greater or lesser part of the undergraduate training in Sweden, or they will be accepted as far as their undergraduate studies are concerned but will have to prove, through longer or shorter medical service in various disciplines, that they are suitable for permanent medical work in Sweden. In no case will it be possible to become authorized as a doctor only after examinations in various medical disciplines. This perhaps reflects the general belief that the suitability of a person for medical work cannot be judged by examinations but only through observations in practical work.

It is also satisfactory that it has been possible to give full and permanent rights to medical work to foreign doctors who have been forced to leave their own countries and move to another one. Of course this has been done not only for humanitarian reasons but because Sweden really needs the assistance of these doctors. They have made a great contribution to medicine in their new country and have helped our health services through a very difficult period. However, for a number of years to come it will be necessary to allow certain foreign doctors to work in Sweden, and under the new rules it will be possible to given them a fair chance to establish themselves in the new country on a basis acceptable to all concerned.

Military Medical Education in Taiwan

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軍事醫學教育在台灣設施之概況

國防醫學院是目前在台灣的唯一培育整套衛生幹部的軍事教育機構，前後已有五十餘年的歷史，內設醫學、牙醫學、護理學、藥學、和醫事技術等五學科，并設生物形態、生物物理、生物化學、醫學生物形態、藥學、內科、外科、物理醫學、牙醫學、護理學、社會醫學、醫學工程、衛生勤物和一般課程等十四學系，協同作育醫師、牙醫師、護士、藥劑師、以及衛生檢驗、衛生工程、衛生裝備和衛生行政等八類人員，目前每年約招收新生220人，其中醫學系70人，牙醫系20人，護理系30人，藥學系20人，以及職業護理班80人，入學資格除職業護理班為初中畢業外，餘均為高中畢業，教育期限醫學系和牙醫系為六年，護理和藥學為四年，護理職業班為三年，並各外加入伍訓練四月和衛生勤務訓練二月，此外，近年還辦理醫學專科教育，專收現役之來受醫學養成教育之軍醫官，每年最多招收60人，修業年限為四年，至於衛生檢驗和衛生工程等班次，近年已暫停辦理，授課方法多採教導式，但最近亦嘗試用分組討論式，社會醫學之設有家庭訪視，則亦推行多年，課程方面，除遵照國防部教育訓令教育制度之規定外，並參照教育部所定標準；惟歷年均迭有修正，以適應實際需要。

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The unique system of conducting free undergraduate education for the provision of medical officers exclusively for the armed forces has had a history of over 50 years in China. It grew out of an expressed need at a time when there were few medical schools in the country, and it has been perpetuated because of the need for an integrated training in the medical sciences and its application to combat groups organized in echelons. A similar system for the training of public health officers was being developed in one of the medical schools in the mid-1930's as a step toward the introduction of state medicine, but further development in the direction was thwarted by the war with Japan that started in 1937.

NATIONAL DEFENSE MEDICAL CENTER

The National Defense Medical Center was organized as part of the development of a nationwide program of medical education. While its primary function is to provide for the needs of the armed forces, every individual and unit trained is a potential addition to the civilian medical services. The production by the NDMC of 75 doctors and a proportionate number of allied medical personnel annually, is tantamount to providing sufficient medical personnel (teams) to take care of the health of 225,000 or more people each year.

The Medical Center was officially inaugurated in June, 1947, in Shanghai by amalgamating the long-established Army Medical College and the Medical Field Service school with its six branches established during World War II. In the spring of 1949 it was moved to Taiwan with the government of the Republic of China.

Today, it is the only educational institution on Taiwan that is concerned with the undergraduate and service training of at least eight types of medical personnel required both by the civilian population and the combat and service units of the armed forces. The eight categories are: doctors, dentists, nurses, pharmacists, laboratory technicians, medical maintenance workers, hospital and supply administrators, and sanitary workers (medical social workers, dietitians, physiotherapists, and others may be added). The educational program is committed to train, under one roof and with one faculty, all types of personnel required by the medical service.

ENTRANCE REQUIREMENTS

The Medical Center accepts 220 new students a year, of whom 70 are medical students, twenty dental, 30 college nursing, twenty pharmacy, and 80 are vocational nursing students. In addition, some 50 overseas Chinese students are admitted each year to the college professional courses. Each medical licentiate class is limited to a maximum of 60 officers.

All applicants for admission to the college courses must have satisfactorily completed senior high school education.[1] A junior high school certificate is required of all applicants for the vocational courses.

In addition to possessing high school certificates, all applicants must pass an entrance examination. This examination includes written and oral tests and physical examination.

Candidates for admission to the medical licentiate course are unqualified or semiqualified medical officers who are not high school graduates.

Candidates for admission to the service courses must be in-service officers and men. They are selected and screened by a preliminary test before admission.

All students and trainees are given free tuition, board, and lodging and receive a small monthly stipend. All equipment is supplied by the institution.

TYPES OF EDUCATIONAL PROGRAMS

To meet existing and future needs, four types of educational programs have been introduced:

1. Undergraduate education of medical, dental, nursing, and pharmacy students at college level;

[1] The duration of primary school education is six years, that of junior high school three years, senior high school three years. Primary school education is compulsory.

2. Undergraduate education of dental (prosthesis and dental assistant), nursing, pharmacy, clinical laboratory, radiology, sanitation, maintenance (maintenance and repair of medical equipment), administration (hospital administration and medical supply administration) students at vocational level;

3. In-service training to:

a) civilian medical graduates who have not received previous training in medical tactics and logistics;

b) advance medical officers who need further training in army medical organization, administration and staff duties;

c) enlisted men who need general or specialized qualification.

4. Licentiate training to unqualified medical officers who cannot otherwise be admitted for college medical education.

Instruction is given in the Chinese language, but terminology is often expressed in English. Standard English textbooks and reference books are used. More than 130 professional journals are subscribed.

FACULTIES AND DEPARTMENTS

Students (college or vocational) or trainees admitted to any of five faculties, namely, medicine, dentistry, nursing, pharmacy, service training and medical technology, are the charge of their respective dean. Courses to meet their needs at different levels are designed and offered by one or more of fourteen departments which constitute the faculty body and which are not divided according to faculties. These departments are:

1. Biomorphics, which is concerned with normal structure in the biological as well as the anatomical sciences.

2. Biophysics—mathematics, physics, physiology, pharmacology.

3. Biochemistry—inorganic and organic chemistry, physiological and pharmaceutic chemistry.

4. Medical biomorphics—bacteriology, parasitology, pathology.

5. Pharmacy—courses in the various branches of pharmacy are offered only to pharmacy students (college and vocational).

6. Medicine and its specialties.

7. Surgery and its specialties as well as obstetrics and gynecology.

8. Physical medicine—radiology and physiotherapy.

9. Dentistry—courses are mainly offered to dental students (college and vocational).

10. Nursing—courses are offered only to nursing students (college and vocational) and trainees.

11. Social medicine—preventive medicine, public health, military hygiene.

12. Medical engineering—maintenance and repair of equipment.

13. Medical tactics and logistics.

14. Humanities—languages, social sciences.

Experience in the 11 years since the establishment of the merged National Defense Medical Center has fully substantiated the advantages originally envisaged of the type of departmental organization needed to train, under one roof as it were, the minimum of eight types of medical and allied personnel. These advantages have been:

1. The number of departments unaffiliated with any one faculty has been kept at a minimum so that effective coordination can be achieved between departments and between these and the administrative body. Better coordination can also be achieved between the related fields within each department whether it is in teaching, research, or service. While interdepartmental barriers still constitute a major problem, the barriers which would otherwise exist if each field were to establish its own department or if divisions were established within departments, have thus been avoided.

2. The number of departmental administrative heads has also been kept at a minimum. This is in accord with the principle of fuller utilization of available staff for purposes of teaching, research, and service, and with the fact that there is a shortage of senior academic staff who have established themselves in a broad field of endeavor and

who are thus in a position to take on additional administrative duties.

3. By grouping related fields under one department, greater economy has been achieved in the procurement, utilization, and maintenance of equipment and other facilities.

4. Training in team work would be facilitated when a sufficient number of staff members are trained in the dynamics of interprofessional relationships.

DURATION OF COURSES

Except for students in the medical licentiate course and in-service trainees who are already officers (or enlisted men in courses designed for them), all undergraduate students, whether college or vocational, are required to undertake military cadet training for a period of 4 months before they are admitted to the basic science courses.

The 6-year college medical and dental courses follow closely those prescribed by the Ministry of Education. They consist of 1 academic year or 40 weeks of training in the basic sciences, 2 years of preclinical training, 2 years of clinical training including a year of clinical clerkship, and 1 year of rotating internship in one of four army general hospitals. This is followed by 2 months of intensive training in medical tactics and logistics.[2] The total duration of these courses is therefore 6½ years.

The professional courses in college nursing or pharmacy are of 4-year duration. Including cadet training and training in medical tactics and logistics, the total duration is 4½ years.

Following acceptance of a graduation thesis, all successful candidates receive the bachelor's degree from the Ministry of Education—M.B., or B.D.S., B.S. in nursing, or B.S. in pharmacy.

Students in vocational nursing now spend 3 years[3] in the basic sciences, nursing, and ward practice and, including cadet and tactical training, spend a total of 3½ years with the Medical Center and its teaching hospital.

All other undergraduate vocational courses have been discontinued in recent years due to limitations in staff and physical facilities.

The medical licentiate course is a condensed premedical and medical course completed in 4 years. Graduates of this course do not receive a degree but are entitled to practice medicine upon retirement from the armed forces after having complied with the requirements for obtaining a medical license.

PROBLEMS

The educational system as evolved by the National Defense Medical Center is capable of enormous expansion without impairing the quality of teaching. Limitations, however, in staff positions, in availability of competent staff members, in the number of students who wish to pursue a lifetime career in the armed forces, in the number of hospitals qualified to undertake internship and residency training, and, to some extent, in laboratory and other physical facilities, have placed serious restrictions upon the institution in developing a program according to its original plans.

Teaching follows the traditional pattern. A good deal of didactic teaching is being done. The curriculum is extremely heavily loaded and is constantly under revision in an attempt to discard non-essentials. Some attempts have been made, particularly in the college nursing program, to institute seminar teaching in which students are expected to do more of their own thinking and learning than is customarily the case with one-way didactic teaching. Some classes, such as those for teaching English, are subdivided into units of not more than 40 students. A student home visiting program has been in operation for several years, but

[2] Now conducted by the Medical Field Service School, a sister institution which since 1957 has taken over all in-service short-term training formerly conducted by the National Defense Medical Center.

[3] Four years prior to 1957.

teaching in social medicine can be further improved by subdividing the medical student group into manageable proportions for follow-up conferences and by studying actual field operations in the application of diagnostic, therapeutic, rehabilitative, preventive, and promotive measures.

The perception of the faculty as to what constitutes good medical education is largely confined to the laboratory and the general hospital. This perception should by all means by broadened to include the entire community of armed forces—the well as well as the sick.

Present Trends in Medical Education in the United Kingdom

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SUMMARY

It is suggested that the Recommendations of the General Medical Council have in the past been so framed as to have led to a stereotyped curriculum and examinational system in most British Medical Schools. The most recent Recommendations (11), of which an outline is given, are designed to encourage, within a defined broad general framework, freedom and initiative on the part of individual Schools, and it is hoped that a number of educational experiments will emerge. The recent formation of an Association for the Study of Medical Education reflects this attitude. Competition for places in British Medical Schools is still severe, and reference is made to the resulting difficulties of student selection and to certain investigations which are being made into this problem. The desirable educational background for entrants to Medical Schools is discussed. An indication is given of the principal ways in which medical education and medical examinations in the United Kingdom at the present time are being increasingly felt to be unsatisfactory, and of the probable lines which reform is likely to follow.

Probably the most important feature of medical education in the United Kingdom at the present time is the thought that is being given to the educational process itself. As has been recently pointed out by Beauchamp (3), there is in Great Britain only one body that is responsible for the licensing of doctors, namely, the General Medical Council. Only those whose names appear on the "Register" kept by the Council may legally describe themselves as "registered medical practitioners," and it is, for all practical purposes, only by such practitioners that the profession of medicine —in either the general or the various specialist fields—is carried on. The Council has the right to prescribe minimum standards in relation to pre-medical education and to the medical curriculum, to carry out visitations of medical schools, and to send visitors or inspectors to report upon the nature and standards of examinations. (The words "visitor" and "inspector" are both in use, having a significance related to the gradual development of the General Medical Council's powers through a series of Parliamentary Acts since the original Medical Act of 1858; but the distinction is becoming blurred, and it is felt to be likely that, in the future, each Medical School will be visited by a small team who will report upon the School as a whole, the quality of its instruction and the sufficiency or otherwise of its examinations, rather than that the present practice be continued whereby a whole series of visitors or inspectors, one for each subject, descends upon the School at intervals over a period.) Whatever the actual mechanism employed, however, the fact remains that, as stated, it is the General Medical Council that is responsible for the sufficiency of the education provided by each and every Medical School, and a mechanism is prescribed whereby, if in any case the Council were *not* satisfied that the education given in a School was such as to guarantee adequate competence in medicine, surgery, and midwifery, the qualification awarded by that School would legally cease to entitle its holder to be included in the "Register." Hence, although the advice published by the General Medical Council from time to time about the nature of the

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medical curriculum and the scope and conduct of examinations has never been described by the Council itself in terms stronger than those indicated by the word "Recommendations," and although Presidents of the Council have (at least in recent years) expressly disclaimed the intention of prescribing any uniform curriculum, or of doing anything beyond prescribing minimum standards below which medical education must not be allowed to fall, there has been a tendency (in practice as well as in colloquial speech) for medical schools to regard the Council's pronouncements as "Regulations." This tendency was encouraged by the fact that the "Recommendations" themselves were usually long, detailed, and precise, so that in fact a more or less stereotyped mode of instruction and of examination came to be the rule in nearly all British Medical Schools. It was, therefore, a welcome change—though not altogether an unexpected one, since the majority of the members of the General Medical Council are representatives of Medical Schools or diploma-granting bodies—when the most recently issued Recommendations of the Council (11) were found to be much less precise and detailed than had obtained previously, and to give educational bodies much more freedom of maneuver. It is indeed the hope of the Council that these bodies will indulge in educational experiment and that different methods may be devised whereby the same end-product may be arrived at—an individual adequately qualified not only to practice medicine, surgery, and midwifery at the time of his qualification, but so equipped intellectually as to be able to adapt himself to changing circumstances and to continue as a capable practitioner throughout his professional life.

It may be of interest to those in countries other than the United Kingdom to be informed briefly of what the present "Recommendations" of the General Medical Council are, but first, perhaps, a note is required as to the meaning in this country of the phrase "Licensing Body." By this is understood a body which grants a degree, diploma, licence, or other authority to practice. The body may be one which both teaches *and* examines (e.g., a University possessing a Medical School) or a purely examining body (e.g., the Conjoint Board of the Royal College of Physicians of London and the Royal College of Surgeons of England). However, the degree, diploma, licence, etc., admits its holder to the "Register" maintained by the General Medical Council only if, as a result of the various processes referred to above, the Council is in fact satisfied as to the "sufficiency" of the qualification in question. Thus, notwithstanding that the phrase "Licensing Bodies" is in frequent use in England—not least by the General Medical Council itself—the statement made at the beginning of this article is nevertheless true, that the Council is the sole body responsible for the licensing of doctors in Great Britain.

The Council recommends that, before admission to the medical course proper, a student should possess a certain standard of general education and also should have passed theoretical and practical examinations in physics, chemistry, and biology; but the precise standard in all these cases is a matter for determination by the Licensing Bodies.

As regards the professional curriculum itself, most of the former very detailed recommendations have been swept away, those that remain being essentially as follows:

> The period of professional study should be one of not less than 5 academic years, and should include instruction in certain specified subjects —(1) Human Anatomy, Physiology and Biochemistry; (2) Medicine (including Child Health and Pediatrics, Social and Preventive Medicine, and Psychological Medicine) and Surgery; (3) Midwifery and Gynecology; (4) Pathology and Bacteriology; (5) Pharmacology; (6) Legal and Professional Obligations of Registered Medical Practitioners, and Forensic Medicine. It is recommended that candidates be examined in the first five of these subjects, and that "the Final or Qualifying Examination shall be in Medicine, Surgery, and Midwifery and Gynecology."

While it is true that these essential recommendations are accompanied by certain "Notes" giving further guidance as to how the Council would expect the recommendations to be implemented, it is clear that the intention is, in fact, as stated above, that individual bodies should feel themselves free, within the general framework suggested, to experiment in relation both to teaching and to examinational methods, more especially as the Council emphasizes that "the memorising and reproduction of factual data should not be allowed to interfere with the primary need for fostering the critical study of principles and the development of independent thought," and asks Licensing Bodies and Medical Schools specifically to consider their "policy with regard to courses of study and examinations and of the way in which it is proposed to realize that policy," with a view to reporting thereon to the Council at a later date.

The general atmosphere in British medical educational circles at the present time is, therefore, a forward-looking desire to remold a system which has become too stereotyped, too mechanical, and above all —because of a system of accretion without much selectivity—much too congested. It is realized that the student is, in general terms, laboring under much too great a burden of forced, and not very well coordinated, instruction, that he is so busy acquiring so-called facts that there is no time for any real educative process, and that, at the very least, a large-scale exercise in pruning, systematizing, and co-ordinating is required, with, no doubt, also considerable changes in educational technics themselves. All this must seem very elementary in circles where such principles have been accepted for years. That is why we have thought it necessary to explain the general background of the British medical educational system and why it is only comparatively recently that experiment in education has, outside comparatively small limits, been thought of as possible. Nor has experiment yet, in general, passed beyond the stage of planning, or even perhaps of consideration, so that it is impossible to indicate in which directions the process may proceed in different places. All that can be done here is to indicate some of the problems being considered and what is, in general, being thought of by way of solution.

It may be noted in passing that, although systematic attention has been given in certain quarters over the last few years to problems of medical education—notably under the aegis of the Royal College of Physicians of London (Ellis [4]) but also in certain of the larger London Medical Schools and elsewhere—it is only within the last year that there has been formed in Great Britain an Association specifically for the Study of Medical Education, a body which recently (1) held its first Conference, to which it was fortunate in attracting not only participants from most British Schools but also distinguished medical educators from the United States and continental Europe. It is the hope of this Association that its members, both individually and collectively, may contribute toward the definition of problems to be studied and their resultant solution, and it was for this reason that the theme chosen for the first Conference was that of "Experiment in Medical Education." Such a development, together with the various interesting papers that have appeared within the last few years from individuals, or from groups working within individual Medical Schools, indicate the increasing development in England of that "awareness" of problems which has, over the last few years, occupied the minds of medical educators in the United States. Some of the reasons have already been indicated why such developments in England might have been expected to be relatively slower than in some other countries, but it should be said that the fact that they have occurred at all is in no small measure due to the accounts brought back to us and to the enthusiasm exhibited, and in turn further generated, by those of our colleagues who

have in fact seen developments in other countries at first-hand.

Questions are often asked as to the numbers of applicants for places in British medical schools. Owing to the practice of most candidates of applying for a place in several different schools, it is—for reasons which will not be surprising to those accustomed to dealing with inquiries of this nature—remarkably difficult to supply a definite answer to such an apparently simple question as what the numbers are, or whether they are at present increasing or decreasing year by year. It seems, however, to be the impression of most schools—apart, perhaps, from those with the most famous names, where lists always tend to be long—that pressure upon places has, in fact, tended to lessen over the last year or two. What is certain is that competition for places in dental schools has increased, and probably from among those who might otherwise have chosen to be doctors. Word seems to have spread abroad that the medical profession may be overcrowded, while on the other hand a good deal of publicity has been given to the present shortage of dentists. The increase in dental applications is of course welcome nationally in view of the shortage in the profession, but the bottle-neck now is not (as it was a few years ago) a shortage of potential students, but shortage of places in which to train all those seeking to come forward. Even if, further, sufficient accommodation could be made available, it is highly unlikely that teaching staff could be obtained in sufficient numbers, in view of the competing financial claims of dental practice. The position in this regard is, in fact, a very serious one, such as can, possibly, be put right only by action at national level.

Among those who do apply for admission to Medical Schools (and, of course, the number is still, in most Schools, much in excess of the number of places available), there naturally arises the problem of selection.[1] It would not seem that this has been any more satisfactorily solved in England than elsewhere. The burden upon individual Deans could, of course, be lightened by the establishment of some central office to which all applicants would send in their names, at the same time indicating, in order, their preference for the various individual schools. The central organization would then arrange, after discussion with the schools taking part in the scheme, for such interviewing of candidates or other means of selection as might be decided upon, and would ultimately furnish each school with a list of those students who had been allotted to it. Such an idea keeps on being suggested by individuals, but has never achieved favor with medical schools as a whole. Each, therefore, struggles on as best it can, but in the unsatisfactory knowledge that (probably) it does not really know what it is trying to do. We presume that we are looking for "promise of developing into a good doctor," but, scarcely knowing how we would define "a good doctor," must feel even more doubtful about defining, and measuring, the qualities which give promise that a boy (or girl) may become one in future. A certain level of intelligence is obviously necessary, although other qualities may be at least as important in the actual practice of medicine—as, for instance, a high moral standard, willingness to sacrifice personal interest for that of others and power to take decisions and accept responsibility. It seems that a great deal more investigation is called for (if it is, in fact, possible) into what constitutes "a good doctor." Millar (9) suggested "job-analysis" in relation to doctoring. He felt that, though it would be a very large task, it could be done. Meredith (8) recently expressed the opposite opinion, and indeed it seems the general view that, so many types of career being comprised within medicine, and so complex and varied the characteristics that lead to its being practised well or ill, it would defy job-analysis in the ordinary

[1] Some of the material used in the section on student selection in this article is, by permission, reproduced from the author's previous publication "Reflections from a Provincial Deanery," which appeared in *The Edinburgh Medical Journal*, **50**:279–314, 1952.

sense, and that empirical studies are more likely to lead to useful results than are methods which at first sight would seem more rational. Among such seemingly rational methods are of course what may be grouped as "psychological methods of selection." There is obviously room here for really long-term experiments, checking data obtained by appropriate methods against the subsequent careers of the persons originally examined. It is disappointing that most experiments so far reported (2, 9) have given so little encouragement, but an interim publication is expected soon from the Nuffield Foundation. This will (one hopes) give the results of an experiment launched some 10 years ago, whereby in the earlier period an appropriate series of objective tests were applied to all (not only medical) students seeking entrance to certain selected Universities; further tests were carried out during the University career of all those accepted; and, in the later period, follow-up studies were made of these as well as of (as far as possible) those applicants who had not been successful in gaining admission. The intention is, of course, to investigate whether or not any correlation exists between the results obtained in the tests applied and "success" at the University and in after-life. The tests were designed to cover not only intelligence but also qualities falling within the domain of character, temperament, and personality. The possible value of such an investigation is obvious, since "intelligence tests" pure and simple can do little beyond enabling selectors, in relation to medical school admissions, to eliminate obviously unsuitable applicants, and thus make more time available for the consideration of those not so eliminated. In any case, as already remarked, a great deal more than intelligence goes to the making of a good doctor, or even of a good student. Determination, stability, adjustability to changing situations—all these may be far more important. And the investigation to which I have referred is designed to discover whether objective methods exist, or may be devised, to measure qualities such as these, and to find to what extent they correlate, or otherwise, with success in the chosen profession. The results of such an investigation should be of the greatest importance, particularly as it was strictly designed to be a test of tests, and in no way a test of students. Sheffield was one of the centers at which the investigation was conducted, and, although the University authorities on their side furnished (under conditions designed to preserve the anonymity of the students concerned) certain information asked for by the investigators, they had no knowledge of what views the latter were forming in relation to any individual, and the investigation played no part in the University's own selection of students or in the subsequent treatment of those admitted.

It is possible that, as a result of the above investigations, or similar ones, information will become available which is practical and useful in the sense of indicating that there are objective and scientific methods which could justifiably replace, or at least supplement, the empirical and personal methods on which we are at present forced to rely in the selection of our students; or it may be information which points in precisely the reverse direction; or it may be indecisive. At any rate, it will be good to know. It is because we are at present fumbling so much in the dark that most of us (I imagine) feel our work in this sphere to be so unsatisfactory. In most cases, I suppose, we make use of an application form setting out the candidate's examinational achievements and his extra-curricular interests and activities, together with a headmaster's or headmistress's report, an attempt being made to synthesize all the available information following a personal interview with the applicant. It would certainly seem unwise, in respect of a vocational profession such as medicine, to dispense with the interview, and yet it is of course precisely over matters arising out of an interview that the opinions of different selectors may differ most sharply, or, even when all are agreed, that the opinion formed

may turn out to be of the poorest prognostic significance. Gordon King (6), for instance, working in Hong Kong, found that only 20 per cent of those accorded the highest grading at interview survived to sit for the final examinations, as opposed to 70 per cent with the lowest grading. No student in the highest interview grade was among the first ten in the class by the time the clinical course had been reached, while four from the lowest grading, "including one double prize-winner," had risen to the upper level of the class. Similar findings were recently reported personally to the writer by a colleague in an English Provincial school. One had been apt to assume that, even with rather rough and ready methods, it was comparatively easy to sort out applicants into one group who clearly should be accepted, and another group who clearly should be rejected. As to the group in between, admittedly, probably just as good results could be secured by drawing names out of a hat; but the initial sorting into the three groups was imagined to be a relatively simple matter. Even this easy assumption, however, appears to be relatively ill-founded. Fortunately, it is true that technics of interview, especially group technics derived from War Office Selection Board practice, are still the subject of intensive investigation, and it seems that the last word has not yet been spoken (at least one hopes it has not) in relation to student selection.

A related problem, and one which indeed constitutes a facet of the whole problem of student selection, is that of the type of educational background desired in potential entrants to medical schools. Here, two contradictory forces are at work—the idea, to which at least lip service is constantly paid, that the potential doctor should have a "broad cultural background" and the fact that in practice there is more and more pressure for "First M.B. exemption" to be obtained before a candidate's admission to the University. This latter tendency is more marked in England than in Scotland, where First M.B. work (i.e., chemistry, physics, and biology) has up to now been commonly undertaken within the University, though ordinances have been promoted within the last year or two whereby, as in England, success in suitable school examinations may be regarded as exempting from the First M.B. examination, the student then entering directly upon the medical course proper (i.e., anatomy, physiology, and biochemistry). As stated, this has become increasingly standard practice in England, not only as a desideratum laid down by University Medical Schools themselves, but from the economic viewpoint. Parents paying for their children's education (a decreasing proportion year by year) are understandably anxious to escape if possible the additional burden of an extra session at the University, while the public bodies who (increasingly year by year) are responsible in greater or lesser degree for the payment of the fees and upkeep of University students, are beginning to suggest that they will pay for a five-session course, but not for a six-session one. There is of course room for argument as to whether a "broad cultural background" is necessarily provided more adequately by the study of "arts" subjects than by "scientific" subjects properly taught, and there will doubtless always be boys and girls whose temperament and cast of thought are such that they are more adequately educated through study of "science" than by that of the arts as generally understood. For such, the mechanism of First M.B. exemption and direct entry to the medical course proper is highly suitable; and, indeed, considerable frustration may be experienced by pupils who, having received a school education of this pattern in England, then proceed to a Scottish medical school and have to do their "First Year" subjects all over again. Nevertheless, the pushing too far of "the First M.B. exemption" principle—with the result that the boy or girl intending to take up medicine often has, after the age of 15–16, virtually no instruction except in physics, chemistry, and biology—is something which many educationists have viewed as unsound, particularly in view of the value (as most of us would think) of a general cul-

tural background in relation to the practice of medicine. (Reference may be made in this regard to a discussion held at the Royal Society of Medicine [12].) It is, therefore, of interest to note that, according to Hemingway (5), of the 2192 medical students admitted to the medical schools of Great Britain in 1957, 1436 (i.e., about two-thirds) entered First Year. The writer finds these figures somewhat surprising and assumes they must be a good deal influenced by the practice of the large Scottish schools. Perhaps because of his own origin and University background, he views them with some satisfaction. It is of course true that, save for those exceptionally gifted academically, it is difficult to get through First M.B. work in one session in the University without *some* previous knowledge of at least chemistry and physics; but the writer's own preference would be, while retaining First M.B. exemption and direct entry to Second Year courses for a limited number of students of suitable temperament and attainments, for the normal practice to consist in First M.B. studies being carried out within the Universities, the school curriculum leading up to this being as broadly based as possible. It should contain *some* physics and chemistry, but only up to (say) the "Ordinary" level of the English General Certificate of Education; and provision should be made (in relation to University admission) for even this requirement to be dispensed with in the case of those whose academic performance in other subjects suggests such high ability that they can reasonably be expected to complete their First M.B. work in one session in spite of the handicap imposed by lack of any previous knowledge of the subjects in question. It seems a pity that the interesting scheme once envisaged by the University of London (7) was never launched. Under it (personal communication), First M.B. exemption on school work was to be abolished, and the subjects of chemistry, physics, biology, anatomy, and physiology were to be integrated into one eight-term course. Only a limited knowledge of chemistry and physics was to be required of entrants, who would, therefore, have had more time at school for "general" subjects.

The place of Botany in pre-medical education is rather an interesting one. Some (with whom the writer would range himself) hold that no student can be regarded as biologically literate unless his studies in biology have included at least a modicum of botanical ones; and most medical schools which still conduct a First M.B. course within the University include Botany as well as Zoology. Yet (for reasons which need not be gone into here) a position has stolen upon us, almost like a thief in the night, whereby, in respect to First M.B. *exemption*, a school pass at the appropriate level in Zoology (with no Botany) is becoming more widely acceptable than a pass at a corresponding level in Biology (i.e., a combination of Zoology and Botany). As stated, the reasons for this odd situation will not be gone into here, nor the further question of whether anything can, or should, be done about it.

Coming now to the medical curriculum proper, the main feature of the situation in this country at present is, as has already been indicated above more than once, an increasing awareness of something amiss; of the need, in making a clear diagnosis of the trouble, for a definite realization of what it is that our educative process is in fact endeavoring to do, for devising means that (so far as we can judge) seem capable of realizing these endeavors, and for discovering criteria that will enable us to judge objectively the success or otherwise of the means devised. Analyses along these lines have been published by several writers (4, 10; and by both of these, as well as others, in connection with the A.S.M.E. Conference, 1958, already referred to), and it is difficult for one familiar with their work to recapitulate the situation without risk of plagiarism. In general, it may be said that the curricula in most schools are recognized to be grossly overloaded, unbalanced, and as showing no clear evidence of policy or design, but rather only of having grown up by a process of

relatively uncoordinated accretion, the whole being inspired by the underlying ideas of "comprehensiveness" and the production of a "safe" general practitioner. (Not that these ideas are necessarily bad; not, in fact, that they may not at one time have been good ideas; the suggestion is rather that, in our uncontrolled pursuit of them, we have landed ourselves in a situation where the means adopted are themselves destroying the ends in view). The examinational system is felt to exhibit the same types of defect; indeed, teaching methods and programs, on the one hand, and the arrangement and type of examinations, on the other, are thought so to react upon one another as to produce a vicious circle. The student's time is overburdened by the pursuit of factual knowledge; his examinations are designed to be a test of the amount of such knowledge acquired, rather than a test of real professional capacity, and are arranged in such a way as to appear to the student as a series of obstacles to be surmounted in turn and then forgotten; even his clinical work tends to be split up into a series of specialized and uncoordinated sections, so that the end-product tends to be an individual so accustomed to being crammed with factual knowledge, which he regurgitates at various examinational stages and then forgets, that he never has an opportunity of acquiring that basic scientific knowledge and those habits of reasoned and orderly thought which, in present-day conditions, are much more important than any attempt at a "comprehensive" education in the purely factual sense. (Especially since one is writing in an international journal, one should perhaps make clear that, even under present-day conditions, some students do survive their ordeal relatively well, and that competent medical practitioners are still not unknown in Britain!)

Some diagnosis of the situation having been arrived at, what is the remedy? The answer is that it is just this which is now being made the subject of experiment.

There being universal agreement that the medical student has for long been carrying too heavy a burden, and in view of the fact that a year of post-qualification hospital experience is now compulsory, the view has naturally been expressed by some that the medical course might be reduced in length. This suggestion has, however, been rejected by the General Medical Council, whose Recommendations (11) still advise a 5-year course (5 years, that is, subsequent to passing the examinations in chemistry, physics, and biology). The Council was "impressed by the importance of ensuring that the practitioner of the future is adequately trained in the medical sciences, and thought it would be unwise to attempt to curtail the time spent on the study of these sciences and on the cultivation of scientific method." Equally importantly, in view of the criticisms of the present curricula set out above, the Council felt "that the primary task at the present time is to find means of reducing the congestion in the curriculum: to instruct less and to educate more." It felt that, were a shortening of the curriculum to be proposed at the present time, the reforms which it hopes for might be defeated at the outset; "congestion might well be preserved if not intensified, and the course would be liable to become still more vocational and less liberal."

Thus, for the present, the length of the course remains at 5 years, and each medical school is working out, within the much freer framework now allowed by the General Medical Council, how best to remould its course in order to overcome the defects depicted above. At this stage, it is of course impossible to say how many schemes may be produced, how (if at all, in major respects) they will differ, and how many will survive the tests of time and competition with other medical schools. The writer has not yet heard of anything being suggested as radical as the Western Reserve experiment; but, even so, quite reasonable reform may be looked for. Greater integration of anatomy and physiology is to be expected; lessening of the total time devoted to these subjects, although, in England as elsewhere, the topographical anatomist is apt not to

yield ground readily; and increase, during the pre-clinical period, of the number of suitable clinical demonstrations illustrative of disordered structure and function. The Second M.B. Examination (anatomy, physiology, and biochemistry) is likely to retain its present position (after 5 terms' study of the subjects in question) and scope (except as modified by the remarks already made). Following an Introductory Clinical Course, designed still further to bridge the gap between anatomy and physiology on the one hand and clinical studies on the other, there will be 3 years of clinical work proper. It is likely, however, that in this period there will be, as compared with the past, fewer systematic lectures and didactic instruction in general, a simplification of the system of "appointments," clerkships, and dresserships into which clinical work is necessarily to some extent compartmentalized, and a greater adoption of the tutorial system, whereby a small group is "followed through" the different stages of the curriculum by a single tutor. It is hoped that these changes will, *inter alia*, help to get over some of the difficulties in the present system emphasized by Ellis (4)—that "teaching and care of patients can no longer always be adequately performed at the same time," that discussion and criticism have tended to be replaced by passive instruction, that an undergraduate has had less and less feeling of being a member of a team, and that clinical experience has tended to be fragmented rather than integrated. There is also intended to be a general lightening of the all-round burden during these years, and (at any rate in the writer's own School) the setting aside of two separate "elective periods," each of 2–3 months' duration, during which there should be no prescribed classes or clinical work, and in which the student will, after consultation with a Director of Clinical Studies and others, undertake work of his own choosing. It is also the intention (again in the writer's own School) to recast the examination system subsequent to the Second M.B. Thus, instead of the Third/Fourth and Final M.B. Examinations, there will be Parts I, II, and III of the Final Examination, at the end, respectively, of the Fourth, Fifth, and Sixth Years (i.e., the 3d, 4th, and 5th years subsequent to passing, or being exempted from, the first M.B. Examination). Not only will this arrangement permit a more rational juxtaposition than obtains at present between time of study of a subject and time of examination in it; it is also intended that the different Parts shall be so related to one another as to permit something approaching a "progressive assessment" of each candidate, rather than to suggest a series of independent obstacles to be surmounted. In addition to the thought being given to the relationships of different examinations to one another, the actual technic of examination is itself being studied. As Russell Brain pointed out at the A.S.M.E. Conference (1), the relationship between teaching and examination is a subtle one, and deserving of further study; while, as long as examinations are used at all as means of assessment of knowledge, progress, or intellectual capacity, investigations into the validity and reliability of different forms of examinational procedure must continue.

With this we bring to an end our survey of present trends in medical education in the United Kingdom. In a way it is a suitable time of talk of "trends," because, as we have sought to indicate, the present is essentially a period of growing uneasiness about existing methods and of a re-thinking in relation to our whole educational process. Whither the trends will lead us is a matter for the future.

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Medical Education in the U.S.S.R.

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Краткий отчёт

Описывается организация медицинского образования в Союзе Советских Социалистических Республик. В СССР в 1956 г. было всего 77 высших медицинских учебных заведений, в которых училось 152,767 студентов. Система МЕДВУЗов включает пять факультетов: лечебный, педиатрический и санитарно-гигиенический, а также институты стоматологии и фармацевтики. Изложены подробно учебные планы этих факультетов.

In the Soviet Union, all matters pertaining to medicine, including the selection, education and training of physicians, and of technical subprofessional personnel are under the jurisdiction of the Ministry of Health U.S.S.R. (Ministerstvo Zdravookhraneniya). The curricula, text-books, and examinations are identical throughout the country, although direct supervision over the schools and the students is exercised through the Ministries of Health of the constituent Republics of the U.S.S.R.

Description of the general education in the U.S.S.R. may be found in a recent bulletin on the subject issued by the United States Office of Education (2). The basic primary or "lower" school lasts 7 years, and 3 more years are spent in the "middle" schools. The middle schools include technical institutions that train dentists, pharmacists, and assistant medical personnel such as feldshers, nurses, and midwives.

Professional education in medicine is carried out in a system of medical, stomatological, and pharmaceutical institutes called *Medvuzes*, a combination-abbreviation of *Med*itsinskiye vishiye *u*chebniye zavedeniya, or "medical-higher educational-institutions." (The term "medical school" in the Soviet Union refers only to institutions for the training of the "middle" medical personnel.)

Applicants for admission to a Medical Institute must graduate from a 10-year school. Students with exceptional grades may be admitted directly. All others are required to pass entrance examinations in the Russian language, one foreign language, physics, and chemistry. The entrance examinations are uniform throughout the country and presumably are given at the same time everywhere.

The number of applications for admission to Medical Institutes is stated to be usually at least twice the number of available places. Approximately two-thirds of the applicants are women. The average age of the freshmen is about 18 years (4, 6).

Tuition fees have been abolished in the higher schools of the Soviet Union. Ostraverkhov (3) states that all medical students receive scholarships, which increase as the student advances, and outstanding students receive additional stipends.

In 1956, there were 77 Medvuzes in fourteen of the fifteen Republics. The Russian Republic, RSFSR, with 56 per cent of the population of the Soviet Union, had 45; the Ukraine, 14; Byelorussia, 2; Uzbek SSR, 4; Kazakh SSR, 3; and eight republics had one each. None was listed for one republic, Estonia (1).

Each Medvuz can have from one to five

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"faculties," of which three are medical, giving three types of courses: (*a*) general medicine (therapy), (*b*) pediatrics, or (*c*) sanitation and hygiene, and the other two are: (*d*) stomatology and (*e*) pharmaceutics. There are 68 Medical Institutes, including individual Institutes of Pediatrics and of Sanitation and Hygiene in Leningrad. To this are added two individual Institutes of Stomatology and seven of Pharmaceutics. However, most Medvuzes offer more than one curriculum, with the result that there are a total of 141 "faculties" in the 77 Medvuzes, as follows: 66 in general medicine, 25 in pediatrics, 22 in sanitation and hygiene, twelve in stomatology, and sixteen in pharmaceutics. The latter two types of courses provide the scientific and managerial cadres for dentistry and for pharmacy, needed in view of the essentially subprofessional education received by dentists and pharmacists.

In 1956, the total enrollment in the 77 Medvuzes was 152,767 students. Thus, there was an average of 2000 students per Institute, with the larger ones in Moscow and in Leningrad having well over 3000. The distribution of students according to the five types of courses was: general medicine, 95,442; pediatrics, 23,364; sanitation and hygiene, 18,438; stomatology, 5,675; and pharmaceutics, 9,848. Seventy per cent of all students were women. There were 27,484 new students admitted, and 17,967 graduated.

There were 16,411 faculty members in the Medvuzes in 1956, or approximately one for ten students.

It is interesting to note that some universities in the U.S.S.R. apparently continue to graduate a few physicians. The official statistical handbook (1, p. 157) tabulates 201 physicians in 1956 graduating from "medical faculties of government universities."

The academic year is divided into two semesters, the first lasting from September 1 to January 20, and the second one from February 7 to June 20. The average number of work hours per week is 36. Examinations are given by the faculty following each semester.

The medical curriculum is 6 years in length. For stomatology and pharmaceutics, instruction is for 5 years. The detailed curricula (5) for these courses of study are given in Tables 1–5.

The first 2 years of instruction in the three medical courses are virtually identical and are devoted to basic preclinical sciences. During the second year, students take government examinations in anatomy and histology at the end of the third term, and in physiology and biochemistry following the fourth semester.

The third year is occupied with pathology, microbiology, pharmacology, and preliminary didactic courses in internal medicine and surgery. During this year the courses in the three types of curricula remain closely similar. Separation of emphasis becomes noticeable during the fourth year, with considerably more hours being devoted to pediatrics in the pediatric course and to hygiene in the sanitation and hygiene course.

At the end of the fourth year the students are required to spend 8 weeks during summer in a rural hospital or outpatient department of a clinic for practical work in internal medicine, surgery, and obstetrics.

During the fifth year there is further separation of emphasis between the three types of courses, and a greater proportion of the instruction is at the bedside in hospital wards. At the end of the fifth year the month of July is spent in practical hospital work with members of the faculty.

The sixth year is almost entirely clinical, with but few lectures in certain specialties. There is continued separation of emphasis between the three types of curricula. Assignment under close supervision is made to dispensaries, first-aid stations, factories, and maternity homes as well as to general hospitals.

Government examinations for the degree of "Vrach" (physician) are given at the end of the sixth year, from May 23 to July 1. All students take an examination on the history of the Communist Party of the Soviet Union and on dialectic and historical materialism. Graduates of the general medical course are

examined in four medical subjects: internal medicine, surgery, obstetrics and gynecology, and hygiene and public health. Graduates of the pediatrics course have somewhat different examinations in the same subjects, except that pediatrics and children's infectious diseases are substituted for obstetrics and gynecology. Graduates of the sanitation and hygiene course are examined in four medical subjects: internal medicine, communal hygiene, industrial hygiene, and epidemiology.

As can be seen from Tables 4 and 5, the curricula for stomatologists and for pharmaceutists are 5 years in length. The first 2 years of the stomatology course are very similar to the first two years of the medical courses, and, in general, these practitioners would be classifiable under the medical profession. The students also have to pass gov-

TABLE 1

CURRICULUM OF GENERAL MEDICINE (THERAPY) FACULTY OF MEDICAL INSTITUTE

(6 years; 12 semesters)

SUBJECT	SEMESTERS TAUGHT	HOURS TAUGHT		
		Total	Lectures	Lab. or Practice
1. History of Communist Party U.S.S.R.	1–3	160	86	74
2. Political economics	3, 4	90	48	42
3. Dialectic and historical materialism	4–7	140	80	60
4. Foreign language, with course in Latin	1–4	220	...	220
5. Physical education, therapeutic physioculture, and medical control	1–4, 10	166	16	150
6. Physics	1, 2	136	68	68
7. Biology	1, 2	190	86	104
8. Human anatomy	1–3	392	118	274
9. Histology and embryology	2, 3	182	66	116
10. (a) Inorganic and analytic chemistry	1–4	140	54	86
(b) Biologic and organic chemistry, physical and colloidal chemistry	1–4	295	131	164
11. Physiology	3, 4	247	132	115
12. Microbiology	4, 5	207	70	137
13. Pathologic physiology	5, 6	155	68	87
14. Pharmacology	5, 6	170	68	102
15. Pathologic anatomy	5, 6	192	87	105
16. Preliminary internal medicine, with roentgenology and radiology	5, 6, 9	274	133	141
17. General surgery	5, 6	189	87	102
18. Operative surgery with topographic anatomy	6, 7	117	33	84
19. Hygiene	6, 7	162	81	81
20. Public health organization, with history of medicine	7–9	125	51	74
21. Therapy, with courses on tuberculosis and physiotherapy	7, 8	253	111	142
22. Surgery, with course on urology	7, 8	209	98	111
23. Neurologic diseases	8, 9	106	44	62
24. Skin and venereal diseases	8, 9	101	44	57
25. Obstetrics and gynecology	7–12	379	83	296
26. Diseases of ear, nose, and throat	8, 9	108	31	77
27. Pediatrics	9, 10	166	66	100
28. Diseases of eye	10	80	32	48
29. Psychiatry	9	90	36	54
30. Legal medicine	9, 10	100	34	66
31. Hospital therapy, with outpatient and therapeutic physioculture	9–12	486	68	418
32. Infectious diseases, with course on epidemiology	10–11	214	32	182
33. Hospital surgery, with outpatient service, with courses on stomatology, traumatology, orthopedics and therapeutic physioculture	9–12	554	102	452
Total hours		6795	2344	4451

ernment examinations before graduation.

The graduates of Medvuzes automatically enter the employment of the government, after a paid month's vacation. They are assigned where they are needed, although it is stated that, as a rule, several choices are offered for selection (3). Outstanding graduates who have demonstrated capacity for advanced clinical work or for research may be selected upon graduation to continue further postgraduate training for higher degrees or specialization. It is stated to be usual, however, to spend several years in practice before such opportunity becomes available (4, 6).

Postgraduate instruction leading to specialization in clinical disciplines is carried out through service in a hospital as *ordinator*, or resident. A period of 3 or more years is usual and is supported by government fel-

TABLE 2

CURRICULUM OF PEDIATRIC FACULTY OF MEDICAL INSTITUTE

(6 years; 12 semesters)

SUBJECT	SEMESTERS TAUGHT	HOURS TAUGHT		
		Total	Lectures	Lab. or Practice
1. History of Communist Party U.S.S.R.	1–3	160	86	74
2. Political economics	3, 4	90	48	42
3. Dialectic and historical materialism	4–7	140	80	60
4. Foreign language, with course in Latin	1–4	220	...	220
5. Physical education, therapeutic physioculture and medical control	1–4, 10	168	17	151
6. Physics	1, 2	136	68	68
7. Biology	1, 2	190	86	104
8. Human anatomy	1–3	392	118	274
9. Histology and embryology	2, 3	182	66	116
10. (a) Inorganic and analytic chemistry	1–4	140	54	86
(b) Biologic and organic chemistry, physical and colloidal chemistry	1–4	295	131	164
11. Physiology	3, 4	247	132	115
12. Microbiology	4, 5	207	70	137
13. Pathologic physiology	5, 6	155	68	87
14. Pharmacology	5, 6	174	68	106
15. Pathologic anatomy	5, 6, 9	188	83	105
16. Preliminary internal medicine, with roentgenology and radiology	5, 6, 9	229	99	130
17. General surgery	5, 6	189	87	102
18. Operative surgery, with topographic anatomy	6, 7	102	34	68
19. Hygiene, with hygiene of children and juveniles	6, 7	185	83	102
20. Preliminary pediatrics	6, 7	121	53	68
21. Public health organization with course on maternal-infant protection, and history of medicine	8, 9	124	64	60
22. Therapy, with courses on tuberculosis and physiotherapy	7, 8	179	83	96
23. Surgery, with course on urology	7, 8	167	58	109
24. Skin and venereal diseases	7, 8	96	32	64
25. Neurologic diseases	7, 8	102	51	51
26. Pediatrics	8, 9	191	80	111
27. Infectious diseases, with epidemiology	9, 10	140	70	70
28. Obstetrics and gynecology	7–9	229	81	148
29. Infectious diseases of children, with epidemiology	10–12	332	91	241
30. Diseases of ear, nose, and throat	11	95	38	57
31. Diseases of eye	10	85	34	51
32. Hospital therapy	9, 10	140	70	70
33. Hospital pediatrics, with therapeutic physioculture	10–12	464	91	373
34. Hospital surgery, with courses on stomatology and therapeutic physioculture	10	210	105	105
35. Pediatric surgery, with orthopedics	11, 12	170	38	132
36. Psychiatry	11	95	38	57
37. Legal medicine	10	85	34	51
Total hours		6814	2589	4225

lowships. Medical graduates may also work for higher degrees in the basic sciences or in clinical subjects, with the goal of continuing in research. Such postgraduate students are known as *aspirants*. They study for 3 years, taking additional work in educational or research institutes as well as performing original research under their assigned mentor. A thesis and its successful defense before a board of scientists are required for the degree of Candidate of Medical Sciences. The highest degree, of Doctor of Medical Sciences, is conferred following further experience, demonstration of original independent research, and on examination before a governmental committee on higher education. In 1956, there were 2,634 Doctors of Medical Science and 13,567 Candidates of Medical Science working in the educational and research institutes under the Ministry of Health of the U.S.S.R. (1).

The Soviet Union also has a system of

TABLE 3

CURRICULUM OF SANITATION-HYGIENE FACULTY OF MEDICAL INSTITUTE

(6 years; 12 semesters)

SUBJECT	SEMESTERS TAUGHT	HOURS TAUGHT		
		Total	Lectures	Lab. or Practice
1. History of Communist Party U.S.S.R.	1–3	160	86	74
2. Political economics	3, 4	90	48	42
3. Dialectic and historical materialism	4–7	140	80	60
4. Foreign language, with course in Latin	1–4	220	...	220
5. Physical education and medical control	1–4, 11	154	8	146
6. Physics	1, 2	136	68	68
7. Biology	1, 2	190	86	104
8. Human anatomy	1–3	392	118	274
9. Histology and embryology	2, 3	182	66	116
10. (a) Inorganic and analytic chemistry	1–4	140	54	86
(b) Biologic and organic chemistry, physical and colloidal chemistry	1–4	295	131	164
11. Physiology	3, 4	247	132	115
12. Microbiology	4, 5	207	70	137
13. Pathologic physiology	5, 6	155	68	87
14. Pharmacology	5, 6	151	68	83
15. Pathologic anatomy	5, 6	170	83	87
16. Preliminary internal medicine with roentgenology and radiology	5, 6, 8	270	129	141
17. General surgery	5, 6	185	68	117
18. Operative surgery with topographic anatomy	6, 7	79	32	47
19. General hygiene	5, 6	121	53	68
20. Therapy, with courses on tuberculosis and physiotherapy	7, 8	201	85	116
21. Surgery	7, 8	138	63	75
22. Skin and venereal diseases	7	85	34	51
23. Neurologic disease	7	85	34	51
24. Hygiene of nutrition	7, 8, 12	218	58	160
25. Public health organization, with history of medicine	10, 11	156	70	86
26. Infectious diseases	8, 9	145	58	87
27. Obstetrics and gynecology	8, 9	140	70	70
28. Pediatrics, with pediatric infections	9, 10	116	50	66
29. Communal hygiene	8–10	280	57	223
30. Diseases of ear, nose, and throat	9	85	34	51
31. Psychiatry	9	68	34	34
32. Therapy, with clinic on occupational diseases	9, 10	165	66	99
33. Hospital surgery, with occupational traumatology	9, 10	148	66	82
34. Epidemiology, with parasitology	10–12	340	89	251
35. Industrial hygiene	10–12	287	70	217
36. Diseases of eye	10	64	32	32
37. Legal medicine	11	76	38	38
38. Hygiene of children and juveniles	11, 12	155	38	117
Total hours		6636	2494	4142

postgraduate instruction for physicians, consisting of eleven Institutes for the Qualification of Physicians. These institutes offer a variety of courses, including correspondence courses, to physicians, and theoretically all Soviet physicians needing additional instructions or refresher experience are eligible to be considered for attendance at 5-year intervals. Many medical and research institutes, of course, also have facilities or actual faculties for postgraduate study.

The population of the Soviet Union in 1956 was stated to be 200 million. There were a total of 329,000 professional medical personnel, of which 288,200 were in the employment of the Ministry of Health. The total numbers include at least 10 per cent of personnel that would not be considered under the category of physicians in the United States. The Soviet physicians were assisted by 930,000 feldshers, midwives, nurses, and other subprofessional assistants, and 1.5 million other workers in the field of health for a total complement of 2.78 million employees, or almost 3 per cent of the civilian labor force.

It is not within the scope of this review to attempt an evaluation of the quality of the Soviet medical education. Suffice it to say that the Soviet system of medicine, based on social and economic concepts that are considerably different from ours, appears to

TABLE 4

CURRICULUM OF STOMATOLOGIC INSTITUTE

(5 years; 10 semesters)

SUBJECT	SEMESTERS TAUGHT	HOURS TAUGHT		
		Total	Lectures	Lab. or Practice
1. History of Communist Party U.S.S.R.	1–3	160	86	74
2. Political economics	3, 4	90	48	42
3. Dialectic and historical materialism	4–7	140	80	60
4. Foreign language, with course in Latin	1–4	220	...	220
5. Physical education and therapeutic physioculture	1–4, 9	170	12	158
6. Physics	1, 2	136	68	68
7. Biology	1, 2	190	86	104
8. Human anatomy	1–3	375	118	257
9. Histology and embryology	2, 3	182	66	116
10. (a) Inorganic and analytic chemistry	1–4	140	54	86
(b) Biologic and organic chemistry, physical and colloidal chemistry	1–4	279	115	164
11. Physiology	3, 4	247	115	132
12. Microbiology	4, 5	191	70	121
13. Operative surgery and topographic anatomy	4	64	16	48
14. Pathologic physiology	5, 6	140	70	70
15. Pharmacology	5, 6	124	54	70
16. Pathologic anatomy	5, 6, 9	158	70	88
17. Preliminary internal medicine, with roentgenology and radiology	5–7	211	88	123
18. General surgery	5, 6	140	35	105
19. Therapeutic stomatology	5–10	365	105	260
20. Orthopedic stomatology	5–10	355	95	260
21. Surgical stomatology	6–10	298	86	212
22. Hygiene, with course on public health organization	6, 7	174	70	104
23. Internal diseases, with physiotherapy	7–10	252	102	150
24. Surgical diseases	7–9	200	68	132
25. Neurologic diseases, with psychiatry	8, 9	96	32	64
26. Skin and veneral diseases	8	70	28	42
27. Obstetrics	8	56	14	42
28. Pediatrics	9	54	18	36
29. Diseases of ear, nose, and throat	9, 10	74	28	46
30. Diseases of eye	10	50	20	30
Total hours		5401	1917	3484

meet the needs of the people of the U.S.S.R. It is a working fact about which we should be informed and which we should try to understand.

TABLE 5

CURRICULUM OF PHARMACEUTIC INSTITUTE

(5 years; 10 semesters)

SUBJECT	SEMESTERS TAUGHT	HOURS TAUGHT		
		Total	Lectures	Lab. or Practice
1. History of Communist Party U.S.S.R.	1–3	160	86	74
2. Political economics	3, 4	90	48	42
3. Dialectic and historical materialism	5–8	140	80	60
4. Physical education	1–4	136	...	136
5. Foreign language	1, 2	136	...	136
With course in Latin	1, 2	120	...	120
6. Elements of higher mathematics	1	108	54	54
7. Physics	2, 3	202	84	118
8. Botany	1, 2	224	120	104
9. Inorganic chemistry	1, 2	220	102	118
10. Anatomy and physiology of man	1, 2	168	84	84
11. Analytic chemistry	3, 4	324	68	256
12. Organic chemistry	3, 4	270	120	150
13. Physical and colloidal chemistry	4, 5	168	84	84
14. Biologic chemistry	5	126	54	72
15. Microbiology	3, 4	136	68	68
16. Hygiene	5, 6	114	64	50
17. Medical economics	5, 6	96	18	78
18. Pharmacognosy	5–7	282	108	174
19. Technology of medicinals, and of galenical preparations	5–7 8, 9	238 244	82 77	156 167
20. Pharmaceutical chemistry	6–9	439	167	272
21. Pharmacology, with principles of pathophysiology	8, 9	176	73	103
22. Legal chemistry	8	102	34	68
23. Organization of pharmaceutic business	7–9	205	93	112
Total hours		4624	1768	2856

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Medical Education in the United States

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The study of medicine is a continuous educational program. The formal curriculum in medical schools serves only as a brief, intensive part of the preparation of the physician. The Second World Conference on Medical Education, to be held in Chicago in August, 1959, points up this idea in its theme—"Medicine—A Lifelong Study."

HISTORICAL BACKGROUND

Medical education is a dynamic program continually challenged by tremendous scientific advances and molded by contemporary social and economic settings. The history of medical education in the United States, though brief, is studded with the names of heroic figures who guided the physician's education to higher objectives and achievements. The earliest doctors in this country were emigrés from Europe or self-appointed clergymen-physicians. A system of apprenticeship training developed in which a young man indentured himself to a physician-preceptor for from 3 to 7 years. Later, sons of well-to-do colonials supplemented their apprenticeships with attendance at such European medical schools as the Universities of Edinburgh, Leyden, Paris, and London. The first medical school in America was the College of Philadelphia, established in 1765 and later known as the University of Pennsylvania. The names of John Morgan, William Shippen, and Benjamin Rush are prominent in the founding of this school. The inaugural address of John Morgan, "A Discourse Upon the Institution of Medical Schools in America," is an eloquent statement of philosophy of medical education and a true classic in the literature of American education (28).

The names of Samuel Bard and Peter Middleton are associated with the founding of King's College Medical School in 1767, later known as Columbia University; and James Warren and Benjamin Waterhouse with the founding of Harvard Medical School in 1783.

It is significant that the first medical schools were founded as integral parts of an existing university. However, in spite of this auspicious beginning, the years 1800–1900 were marked with a general deterioration in medical education. Education could not keep pace with the birth and rapid growth of a vigorous nation, bent on achieving geographic, economic, social, and political security.

During the 19th century, 457 medical colleges sprang up in the United States. They stemmed from ambitions and efforts of individuals, rather than from any initiation on the part of college administrators or legislatures. There was unrestricted competition and rivalry, and the fact that a diploma automatically licensed a "graduate" led to many abuses. The typical curriculum consisted of a course of lectures, scheduled at the rate of five or six per day, over a period of 16 weeks to 6 months; and not infrequently a "second course," which was an exact repetition of the first, was recommended. The lecture and diploma fees were divided among the faculty. It was a period when the "student heard much, saw little and did nothing."

There were, however, "voices in the wilderness" calling for reform in medical educa-

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tion. One was that of Daniel Drake, who taught at Transylvania Medical School (1817) (later known as the University of Louisville) and founded the Medical College of Ohio at Cincinnati (now the University of Cincinnati). He admirably enumerated the short-comings of American medical schools in his *Practical Essays on Medical Education and the Medical Profession in the United States* (1832) (15), and proposed longer annual sessions, a graded curriculum, and some regard for preliminary education before entrance into medical school. Drake was unable to activate his program, but an energetic, dynamic advocate, Nathan Smith Davis, appeared. Davis led a call in 1846 for a national convention to discuss ways and means of improving medical education. This meeting led to the founding of the American Medical Association in 1847, the early conventions of which were primarily concerned with improvement in medical education. Davis, ever an apostle of the reform movement, founded Northwestern University Medical School in 1859, and this school first introduced the graded curriculum. However, the unbridled rivalry among schools prevented general adoption of a progressive program. As Davis wrote, "while the faculty of each school frankly acknowledges the defects in adaption to the present enlarged field of medical science and art, and the urgent needs of the profession, each waits for the other to move first, lest by placing higher requirements upon the time and resources of the student, it should cause its own halls to be deserted for those of its less exacting neighbor" (4).

The Association of American Medical Colleges was founded in 1876, when 22 medical schools sent representatives to a convention in Philadelphia "to consider all matters relating to reform in medical college work" (37). The new organization tried to raise standards too rapidly, and so it was unsuccessful for the reasons predicted by Davis. However, when young American physicians, returning from postgraduate training in Europe, brought back new knowledge of physiology, pathology, and bacteriology, the medical schools were forced to consider the development of laboratories. This afforded some active participation on the part of the medical student, although the last 2 years' work remained largely didactic.

In 1893, at Johns Hopkins, William Welch and his colleagues in medicine, Mall, Halsted, and Osler, under the protective guidance and astounding perception of President Daniel Coit Gilman, introduced the first genuine University-type of medical education with requirements of 4 years of premedical training and 4 years of medicine under full-time faculties devoted to teaching and medical research. This set the pattern for the reforms, long overdue, in medical education.

The Council on Medical Education of the American Medical Association, formed in 1904 and under the leadership of Arthur Dean Bevan and N. P. Colwell, undertook a school-by-school survey in 1907 and attempted to grade the medical schools. There were a total of 160 schools, of which 82 were graded "A" (acceptable), 46 "B" (doubtful), and 32 "C" (unacceptable or hopeless). In the storm that followed their report, the Council on Medical Education successfully sought support from the Carnegie Foundation for the Advancement of Teaching for a critical appraisal of medical education, and Abraham Flexner was selected for the task.

Flexner's report, *Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching* (1910) (18) was scathing and humiliating. It awakened the interest of the nation and brought forth substantial funds from foundations and philanthropists. The weak schools closed, and, from 156 schools in 1910, the number of schools declined to 66 in 1915.

The surveys, *Medical Schools in the United States at the Mid-Century* by John E. Deitrick and Robert C. Berson (1953) (14) and *Preparation for Medical Education in Liberal Arts College*, by Aura E. Severinghaus, Harry J. Carman, and William E. Cadberg, Jr. (1953) (35) jointly sponsored by the Council on Medical Education and

Hospitals of the American Medical Association and the Association of American Medical Colleges, admirably present the current picture and problems in medical education, almost 50 years later. Many recommendations are made for steps that should be taken to maintain medical education at its present level; for example, stabilization of finances, maintenance of balance between teaching, research, and service; curriculum analysis; operational and administrative policies; and contributions of the liberal arts college toward total education of the future physician.

PRESENT

There are today 82 approved medical schools in the United States, of which 79 are 4-year schools and three are 2-year schools of basic medical science (Dartmouth, North Dakota and South Dakota). There are twelve approved Canadian schools and two other approved schools outside of territorial United States (American University of Beirut School of Medicine, Lebanon; and the University of Puerto Rico School of Medicine, San Juan). Four-year schools under development are, Albert Einstein College of Medicine, of Yeshiva University, New York (1959); Seton Hall College of Medicine, Jersey City, New Jersey (1960); University of Florida College of Medicine, Gainesville (1960); and the University of Kentucky School of Medicine, Louisville (1964).

All schools receive and maintain approval through periodic surveys made by the Liaison Committee on Medical Education (1942) which has representation from the Association of American Medical Colleges and the Council on Medical Education and Hospitals of the American Medical Association. Newly developing schools are visited annually during each of their initial 4 years, and fully established schools are visited on a regular schedule. It should be emphasized that medical school inspections and surveys are carried out as self-disciplinary measures and on an entirely voluntary basis. Surveys do not attempt standardization of medical education but encourage variety, experimentation, and freedom of direction. A statement of the "Function and Structure of a Modern Medical School" has been prepared as a guide by the Council on Medical Education and Hospitals of the American Medical Association and the Association of American Medical Colleges (19).

Twenty-nine of the 82 American medical schools are publicly owned, and 43 are privately owned. It is estimated that the educational expenditures of all medical schools for 1957–58 reached almost $185,000,000 and their separately budgeted research expenditures $88,000,000 (41). The growth of research in our medical schools in dollar volume has been 25-fold since 1941. The contribution of federal agencies in financing research in medical schools has increased 55 times since 1941 and approximately two-thirds of university medical research funds are currently derived from governmental grants and contracts (13).

Lack of a functional uniform cost-accounting procedure among medical schools severely challenges the validity of figures published for the cost of financing medical education in the United States. *A Study of Medical College Costs* made at nineteen schools (8) gives promise of a sound approach to this problem, and the Association of American Medical Colleges is now sponsoring a more complete study of medical college financing.

The patterns of entrance requirements to medical schools are quite similar (1). The typical American educational pattern is to enter elementary school at age 6, proceeding to high school at age 14, spend 4 years in high school (secondary school) and enter college, usually at the age of 18. Most medical schools admit some students after 3 years of premedical college work, but 72 per cent of all freshmen medical students possess a college degree, and 79.2 have had 4 years of college (1957–58) (9, p. 1514). Ten schools, The University of Florida, Johns Hopkins University School of Medicine, University of California at Los Angeles, Chicago Medical School, Albert Einstein College of Medicine, University of Kansas, Marquette University, New York Medical

School, Ohio State University, and the University of Vermont, require 4 years. With few exceptions, preparation in general biology, embryology and/or comparative anatomy, general chemistry, quantitative analysis, organic chemistry, and general physics are required for entrance. The science requirements are not much beyond those necessary as part of any "liberal education" for the space age. The balance of the pre-professional time is divided between the humanities and behavioral sciences to provide a reasonable breadth of perspective.

All schools require the Medical College Admission Test administered for the Association of American Medical Colleges through the Educational Testing Service. Four general areas—verbal ability, quantitative ability, understanding of modern society, and basic science knowledge—are covered in the test. The test is designed to measure a prospective medical student's capacity to learn graduate-level material and his knowledge, in comparison with the pool of premedical applicants.

The goal of every medical school is to seek out and select the best qualified students. Schools have little difficulty in measuring an applicant's mental capacities and capabilities through his academic performance in college as reported on his transcripts of credit and the Medical College Admission Test, but a means of evaluating the "priceless ingredients" of potential success in medicine—integrity, motivation for a career, and character—is lacking.

Sir Lionel Whitby in his presidential address before the First World Conference on Medical Education, portrayed the sought-for recruit to medicine. "It is not difficult to draw a brief pen picture of the ideal medical student; cultured, broadly educated in the humanities, intelligent and intellectual, transparent integrity, humane and sympathetic, and, above all, one who will love his profession as well as his fellow men and all of their weaknesses" (43).

In 1957–58 there were 8,030 admissions to medical schools and a total of 29,473 medical students in the United States (41, p. 1517). The greatest number of applicants for places occurred in 1949–50, when there were 24,434 applicants for 7,042 places in the freshman classes. This was the post-war period, made up of a "foot-loose, age-eligible population with funds available for educational purposes." From this peak, the number of applicants fell to the low point in 1954–55 when only 14,538 applicants sought the 7,500 places available. In 1957–58 there were 15,791 applicants for the 8,030 places in the freshman classes. It has been estimated that a predicted doubling of the general college and university enrollment in the United States will bring a progressive increase in the number of medical school applicants so that in 1964, a minimum of 20,500, a maximum of 31,700 and a "best guess" of 22,000 can be expected (27). Actually, the number of applicants decreased from 15,918 to 15,791 in 1957–58, and continued to decline to 15,172 in 1958–59 (24). In addition to this decrease in the quantity of applicants, the quality of the accepted students has fallen. While currently 16 per cent of incoming students had superior grades in their undergraduate college work, 40 per cent had excellent records in 1950 (11). There is further evidence in the attrition of medical students due to withdrawal because of poor academic standing, which has increased progressively in the last 3 years despite all attempts at careful selective screening (41). The situation demands serious attention.

Medicine is now competing with engineering, physics, and other sciences for selection by top-ranking college students. These fields now "provide the prestige, intellectual satisfactions and financial rewards comparable to those offered by medicine" (10). The inordinately long, costly period now required for medical education may also be a factor in deterring young people from the selection of medicine as a career.

This decrease in quantity and quality of applicants to medical schools comes at a time when it is apparent that more physicians are needed. If the seemingly desirable physician-population ratio of 132 per

100,000, which has been quite constant for the past 30 years, is to be maintained, 1,900 additional graduates each year in medicine will be needed by 1970, when the population of the United States is expected to reach 225 million (2). Providing facilities and faculties for 1,900 more graduates per year presents the necessity of staggering expenditures of capital and sustaining funds, and the urgent need for the development of educational personnel. A combination of the establishment of new 4-year medical schools, new 2-year schools of basic medical science (existing 4-year schools are now able to expand their third- and fourth-year classes), plus a modest increase in total enrollment in the present 4-year medical schools is demanded.

The recruitment and selection of medical students present one of the most important problems facing American medical education and are receiving continual study. The Teaching Institute of the Association of American Medical Colleges in 1956 was devoted to "The Appraisal of Applicants to Medical Schools" (3), and the Association has created a "Continuing Group on Student Evaluation" whose primary objective is "to provide a means for medical school admissions officers to meet annually for discussion of mutual problems and study methods of evaluating and developing selection and student personnel programs in their schools." The *sine qua non* of medical education is the medical student.

There is general agreement with the definition of the objective of medical education developed by the Association of American Medical Colleges (1953) (19, 29). "Undergraduate medical education must provide a solid foundation for the future physician's development. It should not aim at presenting the complete, detailed, systematic body of knowledge concerning each and every medical and related discipline. Rather, it must provide the setting in which the student can learn fundamental principles applicable to the whole body of medical knowledge, establish habits of reasoned and critical judgment of evidence and experience, and develop an ability to use these principles and judgments wisely in solving problems of health and disease. Undergraduate medical education cannot achieve these aims if the student is relegated to a passive role. It must provide incentive for active learning on the part of the student. This can best be done by giving him definite responsibility in real, day-to-day problems of health and disease. This responsibility must, of course, be carefully graded to the student's ability and experience and must be exercised under careful guidance of the faculty.

"Given incentive to learn and guidance toward the grasp of principles, with the problems of health and disease as a framework of reference, the student will build the necessary foundation for his career in medicine—be it practise (general or limited), teaching, research, or administration. In working toward this fundamental objective, undergraduate medical schools must strive to help the student to: acquire basic professional knowledge; establish essential habits; attain clinical and social skills necessary to the best utilization of that knowledge; and develop those basic intellectual attitudes and ethical and moral principles which are essential if he is to gain and maintain the confidence and trust of those whom he treats, the respect of those with whom he works and the support of the community in which he lives.

"These five aims are obviously not distinctly separable, but are mutually interdependent. All together they summarize the desirable characteristics of the responsible professional person that medical education is attempting to produce." With varying methods of accomplishment and degrees of success, each medical school is endeavoring to achieve these objectives.

Although the education of a physician ought to be a continuous process and smoothly progressive, it is currently fragmented. There is the period of premedical education or the period of preparation prior to admission to medical school, carried out by the liberal arts colleges which make their own selection of students. Next, there is the basic medical science and clinical education

of 4 years (so-called "undergraduate medicine") under the control of the medical schools; and, lastly, there is the period of graduate and specialty training (i.e., internship and residency) and postgraduate education (continuation studies) variously under the candidate selection, direction, and supervision of hospitals, specialty training boards, American College of Physicians, American College of Surgeons, American Academy of General Practice, local, county, or state medical societies, and last, but not least, the medical schools. No continuous and coordinated supervision of medical education is obtained. Perhaps we do remarkably well, in spite of this division of responsibility between the colleges, the medical schools and the hospitals.

PROBLEMS AND TRENDS

Currently, there is an intense awareness of problems facing medical education. Among the disturbing questions needing critical study and answers are: have medical schools drifted away from their university setting; have medical schools become research- or service-centered, rather than student-centered; is there an intelligent balance between teaching, research, and patient care; have medical schools appreciated the changing social and economic setting in which medicine is practiced; is there adequate consideration of the study of the patient as an individual and an understanding of the social, physical, and emotional relationships between the patient and his environment in terms of health and disease; is there sufficient awareness of the need to call upon the social and behavioral sciences for comprehending fully the impact of environmental factors affecting man's health and therefore his relationship to society; are sufficient efforts being made to attract and train basic medical scientists; can the inordinate length of time before a student qualifies for practice be justified educationally and economically; are the exceptionally talented premedical and medical students being meaningfully challenged; is there sufficient cooperation, correlation, and integration between the departments within a medical school so that a basic core of knowledge can be presented for conceptual learning by the students?

Faculties of medicine have been challenged and have subjected the educational objectives, method, and content to a continuing intelligent and critical appraisal. Curricular analyses with modest shifts in the educational program are taking place in all medical schools (12). Medical schools are hard put to keep their educational programs abreast of the "explosive increase" in knowledge, important to medicine. The medical curriculum should grow by design rather than accretion (5). In general, compendious training and coverage have been abandoned in favor of establishing a basic core of knowledge and conceptual learning. Much of the formal didactic program has been replaced by conferences, seminars, and small group teaching activities. The students are afforded a more active role in their acquisition of knowledge; they are given more responsibility for their own education. The clinical clerkships during the last 2 years now afford the student direct patient responsibility under close supervision. An opportunity is given the student to collect, analyze, and interpret facts and findings for himself, and to observe and understand what he observes. Barriers between the preclinical or basic science years and the clinical years are being broken down by participation of freshman and sophomores in clinical work, the carrying of basic science teaching into the junior and senior years, and combined interdepartmental teaching conferences participated in by the basic scientists and clinicians.

The height to which clinical medicine rises, depends on its ability to utilize and apply the basic sciences which have advanced so phenomenally in recent years. A vertical forward integration of basic sciences toward clinical medicine, however, presents a problem in pedagogy. It has been pointed out that the student must have information in both areas in which correlation is desired, otherwise correlation occurs in the

mind of the instructor (Gray [21]). Interdepartmental teaching programs are breaking down artificial barriers between the basic sciences—the simplest example being the joint teaching of neuroanatomy and neurophysiology. A more complex example lies in the integrated, joint teaching of biochemistry and physiology and microbiology and pathology. Courses in Human Behavior, Human Ecology or Growth and Development, taught jointly by the Departments of Psychiatry, Psychology, Pediatrics, Genetics, Anthropology, and Sociology, have been introduced in the first year by many schools.

Hours of required course work are being curtailed, and "free time" is deliberately scheduled to permit students the opportunity to participate in elective offerings. Greater flexibility of the entire 4-year program is being provided, allowing the student blocks of from 3 to 6 months' time for research or elective work in the basic science or clinical departments, either at the parent institution or another medical school. The student is encouraged to interrupt his program to devote 1, 2, or 3 years in graduate study for the M.S. or Ph.D. degree in one of the basic sciences. In an effort to study the patient as a whole, new disciplines, such as comprehensive medicine and family care (environmental medicine) have been introduced by several schools, using the community as a teaching laboratory and allowing the student to recognize the social, environmental, and medical factors concerned with a patient's illness and their influence on his medical care. This provides better opportunities for learning how to serve the patient more effectively.

Student research programs, as elective work during "off-quarters" with financial aid from a variety of agencies, have been adopted by almost every school and are proving to be a rewarding device for stimulating intellectual curiosity and scientific objectivity. The rapid increase of student participation in medical research, currently involving from 10 to 50 per cent of the student body, is one of the most exciting developments in medical education. This concept is not new. Yale Medical School, since 1925, has required each student to present a dissertation based on original research as one of the major requirements for graduation (26). Research provides a true integrating force and creates in students an appreciation of the philosophy of science.

EXPERIMENTS

In several medical schools distinctive and provocative "experiments" in medical education are being conducted. At Western Reserve (7), which has completed its sixth year of a new program, and at Stanford University (40), which will inaugurate a similar program this fall, basic science is taught according to subjects or areas of unified interest rather than along departmental lines. Laboratory work is carried out in small multidiscipline laboratories employing almost exclusively the experimental approach. Individual courses in anatomy, physiology, and biochemistry, among others, have given way to cooperative courses planned and executed by committees made up of representatives of the departments concerned. A highly integrated and correlated course presents the fundamental principles concerning the biological aspects of man in terms of normal structure and function. Other work of the first portion of the student's career deals with man as an individual and as a member of society. The psychological, sociological, economic and anthropological aspects of man are then examined, and the student is introduced to the patient-physician relationship.

At Western Reserve this work is developed and centered around student observation of a normal patient during the course of pregnancy, the delivery, and the growth and development of the child as a member of the family. The student follows the family all during the 4 years of his medical program. The course work in abnormal human biology follows specific organ systems, with microbiology, pathology, pharmacology, and pathologic physiology being integrated and correlated with the clinical features of a disease to present a complete picture.

At Stanford, the total medical school program is 5 years, most of the students entering at the end of 3 years of college work. The basic medical sciences are spread out over the first 3 years. In addition to the time devoted to medical work, an amount of time equivalent to 1 academic year is distributed equally through the first 3 years and is devoted to nonmedical work.

In 1959, Harvard Medical School (22, 23) took an intermediate step in the introduction of interdepartmental teaching during the first 2 years of the curriculum, presenting a unified approach to the Basic Sciences, which incorporated the advantages of interdepartmental teaching "without losing the impact of an exposure to the philosophies, the aims, and the methods of each separate discipline." In the Freshman year, the first half-year is occupied with departmental presentations of principles of gross anatomy, embryology, physiology, biochemistry, and growth and development. The second half-year is composed entirely of correlative teaching, divided into three blocks, (1) body fluids, respiration, kidney; (2) neuro-sciences; and (3) gastrointestinal tract, liver, and endocrines. A tutorial system forms an integral part of the educational experience. Groups of five or six students are assigned a tutor, and at weekly meetings, informal discussion is encouraged to assist the student in organizing his knowledge and correlating the material presented in his formal courses with its application in clinical medicine and research.

In the second year, during the first half-year, the individual departments (bacteriology, pharmacology, and pathology) present systematically the contributions of their respective disciplines to the study of disease. A series of lectures and conferences on Biostatistics is introduced, and, during the latter part of the first half-year, the Departments of Medicine and Surgery cooperate in the presentation of infectious disease clinics. In the second half-year, emphasis is placed on pathologic physiology of disease and its emotional components, using multidepartmental groups of teachers to present general subjects. Problems relating to the different organ systems are explored and discussed from several points of view. Eleven different departments are involved in teaching during this period.

Several other schools, the University of Kansas, Albert Einstein, University of Florida, Baylor, and University of Southern California, have developed partially coordinated and integrated teaching programs in the basic sciences and unit multidisciplinary laboratories.

Johns Hopkins Medical School (34), the first school to demand 4 years of college work prior to entrance into Medicine, feels now, in 1959, that the medical curriculum is undesirably long and that an "iron curtain" exists between the liberal arts and medical sciences. Therefore, talented students will be allowed to enter the School of Medicine after only 2 years of college work, and minimal requirements for admission consist of elementary college biology and chemistry.

Johns Hopkins students spend 5 years in the medical school, the first 4 years lengthened to four quarters of 10 weeks each and the fifth year occupying the entire calendar year. In the first year, students are given the necessary work in physics, advanced biology, and chemistry. In addition they are required to take mathematics and courses in social sciences and humanities. In the second year they will have, in addition to the present work of a standard freshman medical year (anatomy, biochemistry, and physiology) a continuation of at least one liberal arts or social science course. At the end of this second year, the student will be eligible for an A.B. degree. During the third year, in addition to the usual sophomore medical school subjects, the student will devote some time to such subjects as literature, philosophy, and history, etc. The fourth year will be much like the standard third year. In the fifth year, the student will serve for three quarters as a student-apprentice in the clinical wards of Johns Hopkins Hospital, one-quarter being set aside for elective study. The program shortens the medical program by 1 year and attempts to break down the

barrier between the liberal arts schools and the medical sciences.

Boston University (39) and Northwestern University (9) have announced advanced planning for integrated programs of premedical and medical education. At the University of Vermont (44) "a small group of third year liberal arts college students who had completed the requirements for admission to the College of Medicine are taking the courses of their choice on the undergraduate side along with the anatomical sciences in the College of Medicine. At the end of the second year, each student will have completed all of his requirements for the Bachelor of Arts Degree and will have completed the work of the first year of the College of Medicine."

A committee with broad representation from the College of Liberal Arts and the Medical School at Northwestern University is considering a special program for a group of talented high school students qualified for advanced college standing in chemistry, mathematics, and one of the humanities. This group would be assured of admission into the medical school after 2 years of college work in a redesigned and rearranged order of courses in the basic sciences, social and behavioral sciences, and the humanities. The college course in physics would consist of three quarters of modern physics integrated with mathematics. Chemistry would be completed in six quarters of newly designed, advanced courses in inorganic, organic, and physical chemistry that would give the student a more "liberal" than "professional" education in chemistry and be more basic to the study of biological systems. Biology, advantageously given after the completed courses in chemistry and physics, would emphasize basic concepts of living, systems, evolution, genetics, and embryology, rather than present a traditionally descriptive approach. A three-quarter sequence in behavioral science in the second year would introduce the student to the basic constructs of psychology, anthropology, and sociology. Since the students will have qualified for advanced standing, the English course could be at a more sophisticated level. One-fourth of the student's time in each of the first 2 years would be available for elective courses in the humanities or social sciences. These broadly educated high school students with special aptitude and interest could be expected to acquire a more liberal education than less talented students attain at the end of 4 years of college. The program has great flexibility, permitting the special student to deviate from the minimum program (2 years of college and 4 years in medical school) for additional course work in the Liberal Arts college; to leave the program without serious penalty should his goal be altered; and to consider a combined M.S. or Ph.D. and M.D. degree by further pursuit of a basic science field.

The medical school curriculum, in order to be more challenging and meaningful to this special group and those entering after 3 and 4 years of standard preparation, contemplates the introduction of combined laboratory courses in the basic sciences, to be carried out in unit multidiscipline laboratories; more unified presentation of the basic sciences, eliminating undesirable overlap; the provision for longer contact between the student and a small group of patients in a comprehensive care clinic; and introduction of elective seminars in the humanities.

Honors programs in medical schools have been introduced at New York University College of Medicine and at the University of Kansas (10). At New York University (6), outstanding students are given the opportunity to enter upon careers of investigation and teaching in the medical sciences. The student in the Honors Program is eligible for a position as research assistant in one of the departmental research laboratories.

At the University of Kansas, honor students are relieved of any responsibility for required courses during the first 2 years and are permitted to take what they like. They are only required to pass a comprehensive course at the end of the second year, and the experiment so far shows that these honor students score quite well.

GRADUATE AND POSTGRADUATE EDUCATION

On graduation from medical school, students are awarded the M.D. degree. Practically all of them then enter hospital internship training, although actually only 25 states require this additional educational experience and training before qualification for licensure. The internship, developed at the turn of the century, once provided the medical student with his first genuine patient contact and responsibility and was his final step in preparation for practice. Formerly highly esteemed, it has almost become an anachronism owing to its equivocal position between the clinical clerkships of the third and fourth years of medical school and the hospital residency training programs for specialization or general practice. Abolishment of the internship has been advocated (25, 32), but it still constitutes the first link in the chain of graduate education (33).

Internships (16, 20) are of the following types and frequency; (*a*) rotating (87.6 per cent), which includes 3 months' training in medicine and in surgery and no less than 2 months in pediatrics and obstetrics; (*b*) mixed (1.6 per cent), offering training in two or three of the four major services; and (*c*) straight (10.8 per cent), which provides training on a single service. In 1958 there were 867 hospitals providing 12,325 internships approved by the Council on Medical Education and Hospitals of the American Medical Association. Approval of a hospital's internship education is given by the Council after the results of its field survey are reviewed by the Internship Review Committee, which includes representatives of the Council, of the Association of American Medical Colleges, of the American Hospital Association, of the Federation of State Boards of the United States, and of the American Academy of General Practice. In view of the fact that there were only 6,861 medical graduates in 1958, there was a discrepancy between the number of approved internships and the approximately 5,400 graduates. The deficit was partially filled by graduates of foreign graduate medical schools, whose qualifications until recently were practically unevaluated (31, 38).

Residency training provides more advanced education for one of the specialties or general practice. Young physicians may spend 1 or 2 years beyond the internship in preparation for general practice, or 2–5 years in preparation for eligibility for specialty board certification. In 1958 there were 1,248 hospitals approved for 4,615 residencies, providing a total of 30,595 positions (17; 20, p. 527).

There are examining and certifying boards in nineteen specialties approved by the Council on Medical Education and Hospitals of the American Medical Association and the Advisory Board for Medical Specialties (20, p. 658–92). It is stated that "the primary purposes of the American Specialty Boards are (*a*) to conduct investigations and examinations to determine the competence of voluntary candidates for certificates issued by the respective boards; (*b*) to grant and issue certificates of qualification to candidates successful in demonstrating their proficiency; (*c*) to stimulate the development of adequate training facilities; (*d*) to aid in evaluating residencies and fellowships under consideration by the Council on Medical Education and Hospitals of the American Medical Association; and (*e*) to advise physicians desiring certification as to the course of study and training to be pursued" (33). It is obvious that the American Specialty Boards exert a dominant role in determining the quantity and quality of medical specialty training. To insure the best possible level of graduate education in a hospital's residency program, responsibility for approval of the training program is vested in Residency Review and Conference Committees, made up of representatives from the various specialty boards, the American College of Surgeons, the American College of Physicians, The Academy of General Practice, and the Council on Medical Education and Hospitals of the American Medical Association.

In American usage, graduate education refers to plans for residency training which

lead to qualification in a specialty. Postgraduate training or continuation study, in contrast, refers to formally organized shorter courses, offered by medical schools, hospitals, local, state, and national medical societies which provide advanced instruction in a limited field, primarily designed for physicians in practice (36).

A survey of the field of postgraduate education in 1955 revealed that "a physician adds to his knowledge by participation in the following activities—"(*a*) reading of the medical literature; (*b*) consultations with colleagues; (*c*) hospital staff meetings and conferences; (*d*) local, state, and national meetings of general and specialty medical societies; (*e*) formal post-graduate courses; and (*f*) regional hospital-medical school educational programs" (42). Undoubtedly the most effective method of keeping the physician up to date with the most recent advances in medicine is the formal postgraduate course. Literally hundreds of formal postgraduate courses for physicians were listed in the second annual compilation made by the Council of Medical Education and Hospitals (30). Unfortunately, postgraduate programs have not been evaluated and are given by too wide a variety of sponsorship.

Medical education in the United States, well aware of its responsibility to the public and to the medical profession, is consistently and constantly seeking to improve its educational methods, to raise and maintain its standards, to select its students well, to instill in them wisdom, cultivate knowledge and the philosophy of science, and to foster the tradition that medicine is a life-long study, and service to mankind a life-long responsibility.

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The Association of American Medical Colleges: Its Objectives and Program

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On June 2, 1876, representatives of 22 United States medical colleges met in Philadelphia to form the American Medical College Association which was "to consider all matters relating to reform in medical college work." However, the attempt to develop a program consistent with this objective was doomed to failure, and between the years of 1882 and 1889 the association was inactive. Then, beginning with 1890 and during the 2 years thereafter, 66 schools formed the present Association of American Medical Colleges.

The institutional membership of the Association now consists of all the medical colleges of the continental United States and Canada plus the Mayo Foundation Graduate School of the University of Minnesota, the University of Puerto Rico, the University of the Philippines, and the American University of Beirut—101 in all, the latter three because they are either located in present or former United States possessions or are United States corporations.

Of course, the years since 1876 have seen phenomenal progress in the field of medicine. One important component of North America's contribution to this progress has been the fact of her medical schools and the manner in which, both individually and collectively, they have kept their objectives and activities in tune with the times. Most collective activity of these schools has come to be channeled through the Association of American Medical Colleges.

The present objectives and programs of the Association are a far cry from the days of 1876 and clearly reflect the role which the modern medical school has come to play as the core of the modern teaching medical center and of the manifold teaching, research, and service enterprises that are necessarily involved.

The objectives of the Association are now stated as "the improvement and advancement of medical education (*a*) by developing increasingly effective means of selecting the most able students for the study of medicine, (*b*) by encouraging experimentation in curriculum development and medical teaching methods, (*c*) by supporting experimentation, studies, and programs aimed at improving the ability of students to learn and teachers to teach, (*d*) by supporting efforts to improve the hospital internship and residency as educational experiences, (*e*) by supporting efforts to improve and broaden the influence of continuing medical education, (*f*) by developing the knowledge and leadership necessary to provide for the long-range progress and stability of medical education, and (*g*) by creating and maintaining effective avenues of communication between medical educators and between medical educators and the American public."[1]

The programs of the Association have been developed to support the above objectives. Briefly, these are:

Medical College Admissions Test. For several years, the AAMC has worked with the Educational Testing Service of Prince-

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[1] Quoted from "The Objectives of the Association of American Medical Colleges" recently adopted by the Executive Council.

ton, New Jersey, to develop a scholastic aptitude test which is recommended or required by all United States medical schools as part of the application procedure for each first-year class. Designed to assist admissions officers in the evaluation of the intellectual characteristics of medical school applicants, the test helps provide information regarding the student's breadth of acquaintance with present-day society and his capacity to learn graduate level materials and to understand basic scientific principles.

The MCAT consists of four parts: (*a*) verbal ability—a test of ability to handle verbal concepts; (*b*) quantitative ability—a test of scholastic aptitude measured by testing skill in manipulating the concepts of mathematics; (*c*) understanding modern society—awareness of the contemporary social scene as it is measured by items pertaining to the kinds of problems studied in the fields of history, economics, government and sociology; and (*d*) achievement in basic science —understanding of the basic principles of science as they pertain to the fields of biology, chemistry, and physics.

Although admissions officers of individual schools, along with the premedical scholastic record and the personal interview, may use the results of the MCAT in applicant evaluation, over the years the test scores have given liberal arts colleges as well as medical schools a common yardstick against which they can compare themselves.

At the present time work is in process which will broaden this test so that assessment can be made of such qualities as educability, flexibility in thinking, balance in judgment, critical perception, and ability in selection and synthesis (3).

Research and special studies (2).—For many years the AAMC has conducted programs of study and research through which it gathers, collates, and analyzes information about medical students, faculties, and medical education generally. The MCAT just mentioned above, along with the efforts to broaden its usefulness, constitutes a very important part of the Association's research and study program. One result of this has been that new methods and knowledge have given the schools an increasingly effective means of selecting the more able students for the study of medicine. Another result has been that many schools, in cooperation with the research staff of the Association, are beginning to develop and evaluate new programs designed to improve the ability of students to learn and teachers to teach.

In recent months, a program of special studies, financed by the W. K. Kellogg Foundation, has been initiated which will provide a better financial and administrative understanding of our medical schools and of the manner in which they integrate faculties, facilities, and students into their programs of teaching, research, and service. The fact that administrative and fiscal practices have not kept pace with the recent and rapid expansion of these activities makes this particular program a matter of great importance, particularly at a time when American medical education stands upon the threshold of a period of accelerated expansion and change.

Teaching institutes.—Recognizing the need for the continuing re-evaluation and discussion of educational objectives, subject matter, and teaching methods, and for a national forum in which this can take place, the Annual Teaching Institutes were established in 1953. The MCAT and research and study programs mentioned above provide important data and information for these institutes. In addition to this, many studies are conducted which are specifically designed to meet institute needs. These studies, in turn, add to the over-all effectiveness of the Association's other research and study programs.

The first three institutes examined the role, content, and methods of teaching basic medical sciences. The fourth and fifth focused attention on the students, one dealing with the selection of applicants and the other with the medical school as the environment in which students must live and learn (the ecology of the medical student). Last year the sixth Teaching Institute considered the phenomenon of clinical teaching: its

objectives, the setting in which it takes place, and the inter-relationships between students, teachers, and patients. The 1959 Teaching Institute will continue with the consideration of clinical teaching—this time dealing with the content of clinical teaching, the interdependency of the basic medical sciences and the clinical specialties, the educational effort that follows graduation—particularly as it transcends the medical school into the hospital, and finally the crucial problem of welding into all three of these areas the teaching and learning of medicine as an art as well as a science.

Institute attendance is by invitation and is limited to approximately 125 participants: one representing each member school and the others the disciplines that are related to but not necessarily an intimate part of medicine.

Annual meeting.—A 3-day conference is held early each fall so that university and medical school administrators and faculty, the administrators and staffs of affiliated hospitals, representatives of federal and state governments, representatives of the medical and related professions, and all others who may have reason to be interested in medical education, can come together and hear and take part in discussions of mutual interest. The program consists of the presentation and discussion of selected papers by outstanding national and international leaders, an annual banquet, and the presentation of awards for excellence in the field of medical research and education. In addition, this is the occasion for the annual business meeting of the Association as well as for many and varied special groups and committee meetings. The minutes and most of the papers of this meeting are published in *The Journal of Medical Education.*

Journal of Medical Education.—*The Journal of Medical Education* is published monthly by the Association and is the only publication in the world that is devoted exclusively to the field of medical education. Included in the Journal are articles that deal with the description of teaching programs; with educational experiments and innovations and their evaluation; with philosophical and theoretical considerations of medical education; with the history of medicine and medical education; and with the research and study program of the Association. Articles by foreign educators are frequently published. Regular features of the Journal include editorials, abstracts of the world literature on medical education, news briefs, and book reviews that are important to medical educators, and, finally, a special section which serves as a forum in which interested individuals may carry on discussions that are related to the general field of medical education. Just recently another section has been installed that will offer preliminary reports and summaries of data and information that will be of importance to the current scene in medical education. The circulation of the Journal is international in scope. The current foreign subscription list represents approximately 60 foreign countries.

Other publications.—Besides *The Journal of Medical Education*, the Association publishes several other booklets and brochures on various aspects of medical education: a handbook "Admission Requirements of American Medical Colleges," reports of the Teaching Institutes, the Directory of the Association, a periodic news letter "The Medical Mentor," and occasional special publications and reports of particular importance and interest to medical education. Mr. Augustus J. Carroll's report "A Study of Medical College Costs" is an example of this (1). It is hoped that another publication, a "Directory of Fellowships and Scholarships in the Medical Sciences" can soon be added to this list.

Audio-Visual Institute.—An increase in the availability and importance of audio-visual aids to medical education has warranted the establishment of an Audio-Visual Institute within the AAMC to provide a revolving film library on medical subjects for use by the schools and to provide an

information source for films and other audio-visual aids important in the field of medical education.

Cooperative programs.—1. Liaison Committee on Medical Education: Since the turn of the century, in order to maintain increasingly high standards, the Association of American Medical Colleges and the Council on Medical Education and Hospitals of the American Medical Association have joined in a program in which they pay a periodic visit to each of the medical schools of Canada and the United States and its possessions. The mechanism which the AMA and the AAMC have established for the conduct of these visits is known as the Liaison Committee on Medical Education. While the visits as conducted by this committee are essential to the official accreditation of these schools, they have also become the medium through which each school can be made aware of its weaknesses, of what is needful to correct these weaknesses, and also of its strengths and the opportunities and challenges these provide.

The visiting teams represent the best collective thinking of the educators and the profession. The standards that are adhered to are quite general and are set up so as to provide an umbrella under which each school can use its own initiative in planning an effective curriculum. No attempt is made to dictate what should be taught or the number of hours a subject should require or to legislate regarding faculty, equipment, or facilities (4). The visitors are free to use their judgment as to the nature and extent of any recommendations they may develop for the consideration of either the school being visited or the Liaison Committee and its parent organizations. It is rare that the visitors' recommendations are not accepted by all concerned.

In addition to its visitation responsibilities, the Liaison Committee has come to serve as a mechanism within which the AMA and the AAMC have developed many other cooperative activities, chief of which is the conduct of an annual study which keeps much of the information about medical education current and up-to-date. The report that results from this questionnaire appears each fall in the Educational Number of the *Journal of the American Medical Association.*

2. National Intern Matching Program: NIMP was organized in 1951 as a separate corporation to serve as a clearing house for helping the graduating student obtain an internship at the hospital of his choice as well as to help the hospital obtain the graduate of its choice. NIMP is jointly controlled and operated by the American Medical Association, the American, Catholic, and Protestant hospital associations, the Student American Medical Association, and the Association of American Medical Colleges. A student voluntarily registers with the program and after giving careful consideration to all of the hospitals in which he is interested, submits a confidential list ranking his preference among the internships for which he has applied. The hospital submits a similar confidential ranking list of the students who have applied to it. The Matching Program then, through the use of business machines, matches the student-hospital choices and notifies each of the result.

If they choose, graduates of foreign medical schools may seek internship matching through the NIMP. They are not required to do this, but since many United States hospitals will not accept interns except as they may be matched through the program, foreign graduates desiring internships in these hospitals do join.

3. Educational Council for Foreign Medical Graduates: Co-sponsored by the American Hospital Association, the American Medical Association, the Federation of State Medical Boards of the United States, and the Association of American Medical Colleges, the Educational Council for Foreign Medical Graduates was established in 1957 as a means of evaluating those foreign medical graduates desiring to take internship and resident training in the United States. In

order to accomplish this, two world-wide examinations are given each year. Those who succeed in passing this examination and thereby receive the certification of the Council may then use this as evidence of their qualification when they approach hospitals for house staff appointments or state licensing or specialty boards for examination. Certification of foreign medical graduates by ECFMG is required for registration with the Natonal Intern Matching Program.

This concludes a summary of the objectives and major activities of the Association of American Medical Colleges. While its program is largely American-centered, the Association and its member schools have many interests that extend beyond the borders of the continental United States and Canada. Thousands of graduates and many hundreds of faculty of foreign medical schools are carrying on advanced study and research in our medical schools and hospitals. By the same token, many of our advanced students and faculty are studying and doing research abroad. Exchange of faculty between American and foreign schools is common, and many of our schools, as part of their institutional responsibility, are assisting with the development and strengthening of schools abroad. Faculty and administrators in American medical education are frequently abroad in both formal and informal consulting capacities. Also, their foreign counterparts are often visitors to American schools.

The annual meetings of the Association are always attended by foreign medical educators. Scarcely a week goes by but that the office of the Association of American Medical Colleges receives noted faculty and administrative people from abroad. *The Journal of Medical Education* enjoys a large foreign circulation, and foreign authors frequently contribute to the Journal.

It is important to realize that, while schools of medicine constitute the ruling membership of the Association, membership is also available to individuals who are interested in medical education, and this regardless of their place of residence. This sets up a structure in which the Association can provide a forum for all who may share a common interest in medical education. This makes sense, for, after all, if this troubled world desires a common meeting-ground upon which all nations should be able to speak a common language and share a common interest, what can better serve this purpose than medical education?

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The Role of the Council on Medical Education and Hospitals of the American Medical Association

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In the early development of this nation the needs and limitations of life in a country that was dominantly a frontier-oriented series of communities, not then having the tradition of scholarship and of universities of Old World stature, permitted medical education to germinate haphazardly. Even though a handful of medical schools developed in relation to universities in the latter half of the 18th century, the desperate need for physicians in areas not having universities led to widespread adoption of the apprentice type of medical education. The need, together with the attractiveness to students of professional life and the rewards of title and tuition fees to doctor-teachers, later led to the formation of many proprietary "schools." There were neither standards for the selection of students or faculty, for premedical education, or for medical education in such schools.

This deplorable state of affairs that threatened the health and medical care of all the people in the United States and reflected on the profession itself became a matter of deep concern to leaders in medicine shortly before the middle of the 19th century. The first call for the organizational meeting of the American Medical Association, which came from the New York Medical Society, began with the statement: "It is believed that a national convention would be conducive to the elevation of the standard of medical education in the United States." One of the first acts of the organizational meeting of the American Medical Association, held in Philadelphia in 1847, was the appointment of a Committee on Medical Education (4).

During the next 57 years, the Committee on Medical Education advocated a graded curriculum, some high school preparation for students before their admission to medical school, careful selection of medical students, as well as separation of education from licensure. Until then, the medical diploma of even profit-making proprietary "schools" offering a few months of lectures to unselected students was authorization to enter practice in most states. By 1900, 26 states required examinations for licensure of medical school graduates.

However, the Committee on Medical Education was not as effective as the profession had hoped it could be, functioning as it did only annually and without permanent staff or headquarters.

In 1890, the Association of American Medical Colleges was organized by faculty leaders in some medical schools. It recommended a minimum standard of high school graduation as a prerequisite for entering medical school. However, in 1893, the Johns Hopkins University School of Medicine began functioning with the requirement that all students it accepted must first have acquired a college degree. This set a new high standard for the other medical schools, as well as demonstrating that such a standard was feasible. Johns Hopkins also emphasized the role of the laboratory and of bedside instruction, two characteristics of modern medical education.

With the major task of establishing and

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maintaining high standards for the majority of schools still ahead, the Committee on Medical Education was replaced by the Council on Medical Education in 1904. A permanent staff was assigned to meet the apparent need for more comprehensive and continuing investigation of the problems of medical education. The Council was charged to:

1. Make an annual report to the House of Delegates (the policy-making body of the A.M.A.) on the existing conditions of medical education in the United States (5);

2. Make suggestions as to means and methods by which the American Medical Association might best favorably influence medical education;

3. Act as the agent of the American Medical Association (under instruction from the House) in its efforts to elevate medical education.

The original Council consisted of five physicians, who were leaders in medical education from five of the best schools, elected by the House of Delegates, with staff consisting of a full-time secretary, Dr. N. P. Colwell.

The most serious need in medical education in 1905 was acceptable educational standards. The Council's initial activities were concentrated on this facet, in concert with the state licensing authorities and with the Association of American Medical Colleges. In this regard, it is interesting that the Council has never had legal authority. It has acted by moral suasion augmented by a general acknowledgement of the fairness and objectivity of its recommendations. Most of the licensing authorities of the states have adopted as a requirement of their applicants that they be graduated from medical schools approved by the Council on Medical Education and Hospitals. This lends to Council action a quasi-legal status which in the long view probably has been of benefit to medical education.

The first decade of the Council's existence included the following activities and accomplishments:

1. Establishment in 1905 of an annual conference on medical education and licensure which continues to date. The first conference had, as participants, delegates from state and territorial licensing bodies, representatives from existing Medical Colleges, from government medical services, and from colleges of liberal arts. Its purpose was to secure thoughtful opinions from all concerned regarding recommendations for an initial minimum curriculum and an "ideal curriculum" toward which medical schools should strive. Consideration was also given to what should constitute premedical preparation.

2. Establishment of the first minimal standards of admission requirements to medical schools, and a 4-year graded curriculum. Since 1902, the American Medical Association has published annually in its journal the performance of medical school graduates by school in state licensing examinations. In the early years, this information was used effectively by the Council in its criteria for approval of schools.

3. Surveys were undertaken of the medical schools. The first, in 1906, resulted in classification of schools into lettered groups: A, indicating acceptable (82 schools); B, indicating doubtful (46 schools); and C, indicating unacceptable (32 schools). Considerable resentment developed in the medical colleges from those reports, and it occurred to some of the Council members that obtaining the publication and approval of its work by the Carnegie Foundation for the Advancement of Teaching would materially assist in securing the results desired. This led to conferences with the Carnegie Foundation which eventuated in another survey of the medical schools. That 2-year study, begun in 1908, was conducted by Dr. Abraham Flexner of the Carnegie Foundation, accompanied by Dr. N. P. Colwell, secretary of the Council. The latter made all the Council's medical school records available to Dr. Flexner. The resulting report was a milestone in medical education, for it criticized schools even more severely and pointedly than had the reports of the Council, and reforms previously urged by the Council were advocated (6). The Flexner report had the weight of an independent study of a disinterested body and was distributed widely. It did much to develop public opinion. The 160 schools in 1905 were reduced by consolidation and closures to 95 ten years later, to 85 by 1920, and to 80 by 1927, of which only nine were considered class

C or not acceptable. Since 1929, schools have not been letter-graded, but they have been either approved, put on confidential probation, public probation, or not approved.

4. The great diversity of requirements for licensure by the various independent and unrelated state and territorial medical licensing authorities posed problems. In an effort to provide a continuing mechanism for better communication among the licensing bodies and as a natural outgrowth of the annual conferences it sponsored, the Council encouraged the development of what became the Federation of State Boards in 1912. In the hope of establishing a further mechanism to ease the movement of physicians among the states without sacrifice of high standards for licensure, the Council with others encouraged the formation of the National Board of Medical Examiners, Inc. (7) in 1915, to provide an examination of such a high standard that the various state licensing bodies might accept its successful completion in lieu of their own examinations. This acceptance did subsequently occur on the part of the large majority of the licensing bodies in the United States (8).

5. A year of supervised hospital training, the internship, following the 4-year graded medical school curriculum, was a part of the initial recommendations of the Council. In 1912, it broadened its activities to include survey of hospital internships, with the first provisional list of internships published in 1914. Shortly thereafter, standards were developed and published and served as the basis against which internships were measured for approval.

The important role of *The Journal of the American Medical Association* in establishing the wide influence of the Council cannot be over-emphasized. It was largely through journal publications of state licensure examination statistics in the early years of this century that a demand was created for a thorough overhauling of medical education. Subsequently, the wide dissemination of the Council's findings, classifications, policies, and recommendations in Journal publications were of inestimable value in making the Council's work an effective influence in the improvement of medical education. Until 1933, when its own journal had been established for 5 years, the requirements and membership lists of the Association of American Medical Colleges were published in *The Journal of the American Medical Association* as part of the annual report of the Council on Medical Education.

Medical education beyond the internship in preparation for specialty practice was surveyed by the Council several times between 1913 and 1919. Finally, fifteen Council committees of physicians competent in the various specialty fields were appointed in 1920 to recommend what preparation was essential to achieving expertness in each of the specialties. Again, expected standards of education were documented and published. These activities resulted in the formation of American specialty boards—otolaryngology in 1924, obstetrics and gynecology in 1930, and so on—until there are now nineteen boards and several sub-boards (3). Each board is separately incorporated and relatively autonomous. It is of interest that the ophthalmologists had anticipated the Council in this regard by forming their board in 1917 for examination and certification of qualified eye specialists. The Advisory Board for Medical Specialties was created in 1934 to help co-ordinate the policies and activities of the separate specialty boards. The Council has always worked closely with it and has recently become an official participating organization.[1]

Since 1927, the Council on Medical Education and Hospitals has published annually a list of approved residency training programs in hospitals in the United States in conjunction with its listing of approved internships (3). Both internship and residency programs are visited every 3 years (or more often if necessary) by representatives of the Council. Reports of these visits as well as the information provided by the hospital on questionnaire forms are evaluated by review committees usually consisting of representatives of the Council and representatives of the American specialty board concerned (1). Thus, the specialty training pro-

[1] Essentials for Approved Examining Boards in Specialties, American Medical Association, 1955.

grams are actually approved by specialists of recognized stature in the specialty field concerned.

The Council on Medical Education and Hospitals, along with the Association of American Medical Colleges and hospital organizations, initiated the National Intern Matching Program in 1951.[2] This program has worked most effectively in achieving an orderly matching of students with internship programs of their own choosing (2).

An important landmark in the history of the collaborative enterprise between the Association of American Medical Colleges and the Council on Medical Education and Hospitals was passed in 1942, when the Board of Trustees of the American Medical Association and the Association of American Medical Colleges established a Liaison Committee on Medical Education, with representation from the Council and from the College Association. This committee meets 3 times annually to discuss problems in medical education of mutual concern and to carry back to each organization the recommendations emerging from the discussions. In addition, it is now customary for a member or the secretary of the Council to attend the business meetings of the executive council of the College Association. That council, in turn, is usually represented at deliberations of the Council on Medical Education and Hospitals. Surveys of medical schools are conducted jointly.[3]

In recent years, no important action pertaining to medical education has been taken without prior discussions with the other body, or without the concurrence of the other body. In this manner, the two organizations, seeking the same ends, can more effectively influence medical education in the United States.

Although accreditation of necessity remains a part of the medical school visitation program, the emphasis on consultation with the school in regard to its problems has steadily increased while the emphasis on the accreditation or "policing" aspect has diminished as medical education has matured in the United States and Canada. Nearly all the medical schools have problems in one or more of the areas of administration, university relationships, budget, faculty personnel, student body, curriculum, and facilities. The physicians on the staffs of the Council on Medical Education and Hospitals and of the Association of American Medical Colleges who each year visit a number of medical schools can provide helpful information on the occasion of a visit as to how other schools have coped with similar problems. In addition, medical educators from outside the school visited are also included on the visiting teams. There seems to be every reason to believe that the regularly scheduled medical school surveys are useful to the administration and faculties of the medical schools visited in bringing about desired advances sooner or more fully than might otherwise be the case.

The degree of acceptance of the Council's findings and recommendations by the profession, medical schools, hospitals, the public, and government is perhaps the best measure of its effectiveness over the many years of its existence. Institutions involved in medical education which often in the past considered the Council as a police agency to be avoided if possible, most often now look upon the Council as a consulting agency to be sought when difficulties and problems arise. Today, instances in which the Council's assistance is sought voluntarily as a friendly advisor are far more frequent than instances in which the Council initiates discussions with a school or hospital leading to a survey of educational programs.

To clarify the significance of approval of educational programs by the Council on Medical Education and Hospitals, the following statement has been adopted by the Council: "The basic responsibility of the Council on Medical Education and Hospitals is to act on behalf of the American Medical Association in developing and maintain-

[2] The Student and the Matching Program, National Intern Matching Program, 1960.

[3] Functions and Structure of a Modern Medical School, 1958.

ing the highest possible standards of medical education. Programs at all levels of medical education—medical school, internship, and residency—are evaluated solely on the basis of their educational worth to the students concerned. Decisions concerning the programs are not compromised by other considerations. The Council's approval of a program signifies only that the Council believes that it offers a sound education for the purposes which the program is designed to fulfill. Council approval of a program should not and cannot be interpreted to indicate attitudes or opinions of the Council, its individual members, or the Association of which it is a part in favor of or opposed to social, economic, political, or other beliefs of the organization or institution sponsoring the program."

The Council has published annually since 1940 information on educational opportunities for practicing physicians to continue their education, to help them remain abreast of advances in medicine (9). Its activities in this respect were accelerated after World War II by the accumulated needs and demands of the profession who had been in military service. Medical schools and medical societies were encouraged to provide suitable "refresher" courses. Subsequently, a 3-year study (1952–1955) of the opinions of physicians and of postgraduate course activities was carried through by the Council in an effort to determine the needs in this field (11). An *ad hoc* Advisory Committee on Postgraduate Medical Education was appointed in 1956. This committee prepared and published in 1958 a guide regarding the objectives and basic principles of postgraduate medical education programs.[4] This was widely distributed and is still in demand. Studies are now in progress regarding methods to be used in appraising the educational worth of continuation courses for physicians, with the hope that this will make possible a selective listing of educational opportunities each year that will be of greater value to the profession than is the present unselective listing.

The development of the so-called paramedical areas and their importance to modern medical care have also occupied the attention of the Council and its staff. Such fields include medical and x-ray technology, physical and occupational therapy, and medical record librarianship. The need for educational standards in these areas led to the development and publication by the Council of "Essentials" in these areas.[5] These Essentials were developed and are implemented in cooperation with appropriate national organizations.

The current and continuing function of greatest importance to the Council on Medical Education and Hospitals is the development and maintenance of high standards of medical education in college preparation for medical study, in the medical school, in the internship and residency, and in postgraduate continuing education of the profession throughout their active lifetimes, as well as education in the paramedical fields. All other Council activities are in one manner or another related to this over-riding function. The Council is concerned with elevating standards of education rather than with standardizing educational programs. Experiments in education that are thoughtfully planned and implemented are encouraged, even when they represent considerable departure from traditional curricula and approaches. The diversity of faculty organization, educational program, and medical school-teaching hospital relationships among the medical schools in the United States is noteworthy, illustrating once again that in education, at least, a plurality of approaches

[4] A Guide Regarding Objectives and Basic Principles of Postgraduate Medical Education Programs, Council on Medical Education and Hospitals, American Medical Association, 1957.

[5] Essentials, Council on Medical Education and Hospitals, American Medical Association:

1. Medical Record Librarians, Acceptable School of, 1952.
2. Medical Record Technicians, Training of, 1958.
3. Medical Technology, Acceptable School of, 1958.
4. Occupational Therapy, Acceptable School of, 1949.
5. Physical Therapy, Acceptable School of, 1955.
6. X-ray Technology, Accredited School of, 1955.

can result in comparable and equally acceptable products.

In concert with the Association of American Medical Colleges, the Council has directed study and informational efforts toward expanding educational facilities in medicine to meet the demands of an increasing population having greater health consciousness. A related activity is the development and wide dissemination of more adequate career information about medicine for high school students, in order that a greater number of the most capable young people may be attracted into medicine. Neither existing medical schools nor those yet to be founded can function effectively without an adequate pool of applicants from which to select their student bodies.

The Council continues to serve as a central reference source of information and consultation related to all areas of medical education. It continues to collect, collate, and publish each year information on basic medical education, internship and residency training programs, postgraduate continuing study opportunities, and medical licensure statistics. Hence, four special numbers of the *Journal of the American Medical Association* annually carry reports on these studies, reports that are widely regarded as authoritative and that provide unique data (3, 5, 7, 9). Another aspect of this kind of activity is the planning and implementation of the Annual Congress on Medical Education and Licensure, in co-operation with the Advisory Board for Medical Specialties and with the Federation of State (Licensing) Boards (10). The Congress is specifically designed to provide a forum for full discussion of issues of contemporary importance to medical education and licensure.

The current major activities by the Council continue to be devoted to continuing survey and evaluation of existing and proposed medical school, internship, and residency educational programs, as well as of existing and proposed educational programs in the paramedical areas, in consultation with pertinent national organizations. The Educational Council for Foreign Medical Graduates, Inc.—an evaluation mechanism for foreign medical graduates, replacing the recommendatory list of foreign medical schools published jointly by the College Association and Council—was developed under sponsorship of the Council in cooperation with the Association of American Medical Colleges, the American Hospital Association, and the Federation of State Boards.[6]

There is in progress the development of a graduate program to better prepare physicians for family practice. Relationships with the specialty boards and residency review committees are being clarified and stabilized, together with the maintenance of other important liaison relationships between the Council on Medical Education and Hospitals and the numerous organizations significant to medical education at all levels. As Thomas Hood wrote, "When was ever honey made with one bee in a hive?"

(In the event that certain of the references and footnotes may be of interest to foreign readers, it should be noted that reprints of all but (4) are available through the Council on Medical Education and Hospitals, American Medical Association, 535 North Dearborn Street, Chicago, Illinois. In those instances which represent an annual publication, the most recent edition has been listed in the footnotes.)

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International Trends in Medical Education

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One of the most rewarding achievements of the World Health Organization during its short life of 10 years has been its contribution to the education of professional personnel from many countries in the world by sending them under fellowship grants to the older universities, medical schools, and other scientific institutions. Although the Organization has given from time to time direct support to medical education in the form of grants to undergraduates, its main effort has been devoted to the post-graduate stage of training. It has been most gratifying to both Headquarters and the Regions to see the steady flow of able young graduates from the less advanced countries to the old established universities where they have been obtaining the higher grades of educational experience. Many of them have also been carefully prepared to become teachers themselves and leaders in education and research on their return to their own countries. In its program, as one might well expect, WHO has paid special attention to the public health services, but with a realistic view of existing conditions in many of the less advanced parts of the world. Indeed, it could be said that the trends in medical education have been influenced during the short period largely by skilled adjustment of education facilities to the needs of individual students. A good deal of stress has also been laid on the immediate needs of treatment and care of the sick as one step on the long road to health. This applies particularly to hospital care, occupational health, and the training of general practitioners. There does come a time, and perhaps it is very near, when one must look to a change in emphasis, especially in a fluid subject such as medical education. It is not going too far to say that the primary object of WHO's help during the next decade will be to raise progressively the teaching capacity of medical schools and institutions by improving the practical opportunities for the training of post-graduates, either in their own countries or at least in the region that serves these countries. The burden of teaching and practice will be increasingly borne by great teaching institutions which are being developed in many of the advancing countries, and so fellowships within the regions deserve energetic measures for promotion. In this connection we think of many of the developing schools of Europe, and also of the advances in training, practice, and research that are being made so rapidly in such areas as Asia and Africa. The trend is toward self-sufficiency of nations. The guidance must come from a central organization which can see and estimate international needs and the stimulus which can give the necessary help.

So far, we have been dealing mainly with the fellowship organization and with means of training promising post-graduates in teaching and research. The influence in these spheres is incalculable. Nevertheless, one should also refer to the assistance that the Organization is giving to countries by sending senior graduates and experienced scientists who spend varying periods up to 2 years or more in giving advice and practical assistance to individual countries. This applies especially to the planning of teaching courses, laboratory and research organization, and in general to giving the fruit of their experience to the advance of knowledge.

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These are the functions of WHO in rather general terms which illustrate the broad trends of medical education to which it is giving its support. We may now turn to the subject of medical education in greater detail, because in nearly all its aspects it is one of the special interests of the organization. Fellowships are perhaps the most important means of steady and productive influence; but there is no routine about fellowship grants. As a matter of general policy, the aim of WHO is to offer grants to men and women of maturity who are pursuing the study of a special subject—one of the sciences, for example—which has not hitherto been adequately represented in their country and its schools of learning. The responsibility is best carried out when the student is consciously pursuing a particular study, especially in the realm of the promotion of health and the prevention of sickness; the control or the eradication of communicable disease; the administration of public health services; and, last but by no means least, the promotion of medical education itself. WHO has a duty, at the request of governments, to undertake surveys of medical education with the object of finding out the needs of a particular country in their proper order. Does a deficiency lie, for example, in the facilities for research, in spite of a tragic wealth of material crying out for investigation? Is this gap due primarily to lack of trained personnel, and if so, at what level? Sometimes the greatest need is for the training of auxiliary workers, and for this purpose teachers have to undertake special courses; sometimes the greatest need is for top-level research teachers and scientists. It is possible that medical education can best be promoted by the provision of teachers from abroad to assist the local staff to set up their own arrangements and to advise on administration. In other cases the needs of medical education may be met most suitably by sending out specialist teams to introduce new techniques, and to teach students by fresh methods of demonstration and practice.

At any rate, WHO would never aim at securing uniformity of teaching, but rather direct its goal toward a unity in diversity. It would not dream of trying to impose a curriculum or a special method of teaching. On the other hand, it is of great importance that WHO should obtain its advice at the highest educational level—and for that purpose the "expert committee" plays an essential part. In the field of medical education, expert committees deal with such matters as the basic medical sciences, the organization of curricula, and the administration of medical schools. The establishment of minimum standards for accreditation is another subject of outstanding importance.

In addition, it is gratifying to observe that medical education groups are now paying more attention to the general subject of the training of a doctor and to his functions in the community. There has also been a great deal of re-thinking on the role of hospitals in training the medical student, and in particular on the use of out-patient departments for this purpose. On the world scale, however, we must not be content with training and planning by methods which no longer meet the needs of the world of tomorrow. Medical education in the less developed countries demands better methods for the collection, the expert analysis, and the distribution of educational material. The organization of courses and the provision of teachers are not enough; we must achieve the quicker and wider distribution of educational and research knowledge and not be content with allowing the developing countries to go through the old phases of development that required a century of growth.

From the vantage point of today we may almost look back in anger at the long successive phases of medical education during the past century and hope that in the days to come the advancing countries may be able consciously to discard what has proved a waste of effort as they build the schools of tomorrow.

Here are the successive periods of medical education:

1. *The "apprenticeship" period.*—Do not imagine that this phase is dead. It may have been asleep, but it is awake again and is in

fact the method of choice in many of the developing countries today. Among ourselves it may well rise once more to influence and power; and the so-called intern year may become for many an apprenticeship preparation, or "running-in" for general practice. There is a good deal of logic in this, especially in countries where the crying need for widespread rural practice, with the help of nurses and auxiliaries, is more and more keenly felt.

2. *The "all-sufficient" period.*—During this phase the general practitioner was responsible for the whole range of medicine. This was a narrow field, shortly before the introduction of antiseptic surgery; and at that time the hospital was often greatly feared, and looked upon at best as an unhappy necessity. We need not dwell upon this twilight interval in the practice of medicine.

3. *The first scientific period.*—This was the golden age of the practitioner-consultant, the general physician who used the laboratory and the dawning specialist services of the hospital according to his experience and judgment; but there was no invasion of his domain. The hospital was his servant, and the consultant—if he cared to ask his advice—was a man of his own class, better equipped, perhaps, with experience of a special group of diseases, but without any notable armamentarium at his disposal. He was, in the words of the time, a "second opinion"; and, as often as not, he was, or had been, in general practice himself. This type of practice has died out in the less advanced areas of the world, chiefly on account of the rapidly growing power of modern equipment and, on the other hand, the perpetual use of antibiotics. If it survives at all, it will be in the rural districts of the more populous communities, as in the United Kingdom.

4. *The rise of specialism.*—In this period bacteriology and, later, chemistry came into their own. It was also the day of the "Great White Chiefs" in the teaching hospitals—the men who made the grand round followed by a trail of nervous nurses and open-mouthed students. The rise of specialism, especially in the cities, inevitably meant the decline of general practice; although it retained its honor and its toil in the country districts. In these days, when it was the ambition of every student to become a chief, it is not surprising that the family doctor should be on the wane. In the larger hospitals he was replaced by the man who cultivated intensely a small field, and the result of this was that the medical student saw less and less of the type of case that he would have to attend in practice, and more and more of the rare disease. "I was shown a very interesting kidney yesterday" said the student of my generation; but, outside his midwifery visits he never saw an interesting home and family.

5. *The return of the general physician.*—It may seem strange to give this heading to a paragraph at the very time when the new scientific medicine has been making such immense strides, in the wake of world-shaking discoveries in atomic radiation, cellular pathology, and many aspects of physics. Yet this title serves to bring out the early signs of a division in the practice of medicine which may affect the entire world. If this split were to become permanent, it would involve the separate practice of medicine as a technology and as an art. Both aspects would of course overlap in the real sense that they would be joined together in the prevention and medical care of sickness, in the individual and in the group. However, the one would retain many of the properties of the humane art, requiring in the practitioner (and therefore in the student) the qualities of

> Kindness . . . kept within such bounds as to make sure it does not consume the doctor's own mental energy or spoil his judgment . . . And alongside kindness, if his intellectual and moral qualities are properly attuned, courage and honesty will develop. Equipped with these, he should soon acquire a proper humility, and by a proper humility we mean a realization of his limitations linked with a reasonable confidence extending over his area of competence. From a combination of these various qualities will come a sense of responsibility. (1)

From this beginning the Report (1) goes on to describe the *intellectual* qualities that the young student should possess: curiosity, that makes him want to find out; from this comes the development of memory, because the discovery is intrinsically interesting. The doctor in practice needs the capacity to look, observe, and deduce; to stand back and see all sides of a question, to be dispassionate and not gullible; and an aptitude to apply scientific principles and not accept blindly the first explanation—or the single case—and yet to realize that science can never answer all the medical questions.

On the technological side the trends are undergoing rapid changes which will inevitably affect the advancing countries. The tide of discovery which is sweeping over scientific medicine is no longer confined to the clinical sciences which could be included in specialist and consultant practice, such as radiology, anesthesiology, and the highly specialized branches of medicine and surgery, with special emphasis on organs such as the brain, the lung, or the heart. Many of these, it is true, have now acquired wide technological implications, far removed from the sick individual; but they only lie on the borders of the new technology in which a great part of diagnosis and treatment are, so to speak, fed into a machine for analysis and report.

There is another aspect of technological development which does not depend primarily on the machine, but on the subdivision of medicine into separate disciplines which may gradually lose what they still have in common. In some countries, such as the U.S.S.R., an interesting and significant development is taking place through the division of medical training into clinical care at special centers, with separation of function into general medical work, pediatrics, and public health. This division of function begins in the undergraduate training, and is becoming a feature of medical practice in the field.

In France there has been a rather sharp separation between undergraduate teaching in the universities and in the hospitals, and a certain amount of overlapping, especially in the earlier clinical subjects, has taken place. At the moment a project of reform is being put forward, with the primary object of bringing together the medical school and the teaching hospital and placing medical teaching at all levels on a full-time basis. This process of integration is meeting some opposition from certain sections of the profession, much in the same way as the national health service in the United Kingdom led to a fear of too much governmental interference.

ILLUSTRATIVE TRENDS IN UNDERGRADUATE MEDICAL EDUCATION IN VARIOUS COUNTRIES

Africa.—In the continent of Africa there have been a number of distinctive movements in medical education. In recent years the older schools have been strengthened, and advances have been notable in Khartoum and Uganda (Makerere). The University College at Ibadan has made good progress toward acceptance by the General Medical Council as a complete medical school and its support from the University of London continues. Movements are also taking place toward the establishment of university status in Kenya, and plans are already under active consideration in Ghana. One of the most interesting developments of the present and immediate future is the consolidation of medical teaching in French West Africa. Great advances are being made in the teaching of pediatrics in Dakar, which has achieved university status in relation to France for a considerable time. In this area one may expect a development in the practical teaching of students for work in rural areas.

Perhaps the most important and significant event in the medical history of Africa has been the proposal to establish a medical school in association with the University College of Rhodesia and Nyasaland. A strong planning committee was appointed by the College in August, 1956. In its first report, of June, 1958, the committee recommended the early establishment of a medical

school which would engage in both teaching and research. The school should be built at Salisbury and should use the Harari hospital as its main teaching unit. The course of training should lead to a qualification registrable by the General Medical Council of Great Britain.

In its second report, of March, 1959 (1), the committee set out in detail its views on the broad principles of medical education as applied to the central African situation. In making this outstanding report the committee has succeeded in setting out a philosophy of medical education which extends far beyond even continental boundaries and will stand as an example to be followed by all medical plans of training in the developing countries of the world. The proposals for the 6 years' course show a clear idea of the difference between integration as a theory, and its practice in bringing together certain subjects of fundamental importance. Indeed, one of the most striking recommendations is that anatomy and physiology, so far from being curtailed, should be carried far through the clinical years along with pathology.

The Americas.—In the Americas a great deal of experiment has been carried out, mainly in two directions. In the first decade of the century Richard Cabot introduced the teaching of the social component in medical training, and this practice has spread widely and with many interesting local variations. The creation of a special health district won a place in many schools which followed the experiment of the Eastern Health District in Baltimore. In a number of schools the out-patient department became a center both for senior teaching and for introducing the student to family care. An excellent experiment was tried out in the school at Augusta (Georgia) through the appointment of a special out-patient physician to direct the students. In Harvard a social-medical series of conferences has greatly enhanced the social value of clinical teaching, and similar schemes have been successfully employed as far apart as Saskatoon, Denver, Berkeley, and Puerto Rico. The progress of the last-named project has been followed with especial interest on account of the thoroughness of the teaching and its consequent use by the students in both social and public health work.

Dr. John Grant, who has done so much to advance social medicine in undergraduate teaching, noted that the topic of trends in medical education raises two considerations: first, medical research and its present stage of evolution; second, the extra-mural responsibilities of medical schools. In conventional medical teaching he points to the main defects of the inter-war period and suggests that their removal from the curriculum would enable students to train themselves in psychology, anthropology, and other social sciences. In this way they would learn how to observe the individual in the setting of his family and against the background of his environment. For this purpose the creation of a medical center, which in some respects is an extension of the old out-patient department, has the advantage of being able to train together all categories of health personnel, and in this way those who are going to work together in the field can be to a large extent trained together, without interfering with the special basic knowledge of any one group, such as nursing and medicine. The development of the idea of a "comprehensive care clinic," with continuity of observation of the family in the home, the clinic, and the hospital, helps still further to consolidate medical teaching and hospital care.

It has been noted that each medical school has its own separate opportunities and its own special problems. No one would attempt to standardize curricula; they should be developed at the level of the particular competence and interests of the faculty, the needs of the students in the country or region where they are likely to work, and the resources of the school and its hospital. To put this in another way, curricula should not be transferred from one school to another merely on the basis of success in a particular environment. (See, for example, Bowers, J. Z., "A Comprehensive Evaluation of the Development of the Medical Curriculum." *J. M. Educ.*, **33**:293–96, 1958.)

The outstanding question that has to be

solved is not the construction of a curriculum, but rather its simplification. In other words, how can the total content of the medical curriculum be modified to reduce the enormous amount of detailed factual information with which the student is burdened? There must be a drastic cutting-down in the quantity of material to be learnt in detail and the introduction of some flexibility according to the varied interest of the student. On the broader plane, as was pointed out in the Revised Program of Medical Education at Johns Hopkins Medical School, the most important defects of the course are: (*a*) the excessive number of years required to train a physician; (*b*) the dichotomy which exists between the liberal arts and the medical sciences; and (*c*) the noticeable decline of strength which has recently taken place in the basic science departments of medical schools.

My own feeling about this admirable effort in creating a more liberal medical curriculum is that it is full of promise because it gives the student a wider view of his professional responsibilities and of medicine as an art. The risks, on the other hand, which must be keenly watched, are the gradual nibbling away of the student's free time so that he becomes overburdened, especially in the later clinical years. It is of the utmost importance that unscheduled time should not be stolen, however keen the teacher is and the students may be to introduce new knowledge. In writing on postgraduate studies, my colleague, Professor Grundy, and I made the following comment, and I think that it is quite as applicable today to the undergraduate:

> In many schools in Europe the postgraduate curriculum in public health has a baneful likeness to the undergraduate course in being overcrowded with detail, badly integrated through lack of co-ordination between departments, and unshapely in its proportions. It is not enough to meet these difficulties simply by a reduction in the quantity of facts poured into the student from all sides without reference to his health, welfare, recreational and other needs.
>
> It is our duty, in a planned curriculum, to show how and when the mature student has time for his home and family life, for rest and recreation, for reading and writing, and, above all, for thinking. It would be nonsense to expect a rigorous timetable, especially when much of the work consists of outside visits to institutions, health departments, etc.; but the onus of showing space in a curriculum for other things rests upon teachers who propose a timetable of lectures and practical exercises. Yet it is pathetic to see how many schools demand from their candidates the very qualities which they are industriously stifling by an overcrowded curriculum—the qualities which raise a vocational course to university status. We must show, for example, when the students have time for reading in the library. At present most of them have very little time to spare; even their evenings are cluttered with revisions and preparation of dissertations. The educational value of leisure does not seem to be sufficiently appreciated [2].

The University of Pittsburgh has created an out-patient program for senior students which has been designed to give them more responsibility for the care of their patients. This gives to the students a feeling of proper responsibility for the patient as a patient, not just for a limited part of student work. This does not, of course, supplant the teaching of medicine at the bedside, but rather fulfils its purpose; and, above all, it gives the student the opportunity to see as a whole the kind of medicine which he is likely to practise in the homes of the people after his graduation.

At Cleveland, in the Western Reserve Medical School, it has been realized that the medical student of today could not possibly absorb the vast accumulation of knowledge which was set before him like an overloaded platter. The Faculty has therefore laid the emphasis on the basic concepts—the mechanism of disease—and has given particular attention to the need for continuing self-education on the part of the student, both in the learning of techniques and in the broader philosophy of medicine. It has also tried to secure greater integration by linking the preclinical and clinical disciplines and dealing with the curriculum on a basis of group planing and group teaching. By this means the curriculum became much more fluid; a great increase is taking place in tuition by discus-

sion methods, and the students take a great part in a very real sense in the appraisal of the programs.

One of the most impressive features of the development of medical education in the Americas has been the freedom and boldness of experiment. In the Latin countries and in Mexico, special emphasis has been laid on the social aspects, especially in countries where a scheme of social insurance has been fully developed. It is interesting to observe that in Mexico and in various parts of the American continent organizations have been formed with the object of studying the needs of medical students and the concept of a greater degree of partnership between teacher and student. The day of the remote "Professor" delivering his daily lecture from the rostrum is almost over in the Americas.

An important evidence of the increase of interest in medical education is the recent formation of a consultant group by Surgeon General Leroy E. Burney. This is a group of 21 distinguished educators in science, nursing, dentistry, hospital services, and the broad disciplines of medicine.

Asian trends.—The All-India Conference on Medical Education, held in 1955, made it clear that a large amount of reform in the curriculum was necessary. The existing system was not adapted either to India or to the modern conditions generally. The special needs were an increase in the number of doctors practising in rural areas and a scheme of training appropriate to their requirements. Emphasis was laid on certain aspects of training, even at cost of reducing the time allotted to the traditional course. The new subjects included preventive and social medicine, pediatrics, and psychiatry. Simultaneous changes were recommended in pre-medical teaching and in the system of examination.

The principal elements in the proposed changes were as follows:

In the first 2 years monthly clinico-social conferences in which the student was presented with an all-round assessment of cases of unusual interest. Ten-minute discussions were to be taken by members of each department, with the object of bringing to the fore the salient points which had led to the patient's condition. The presentation by the department of preventive medicine traces the essential causes of the conditions which gave rise to illness and indicates the ways in which a recurrence might be prevented. The student is made to realize that the responsibility does not come to an end when the patient is discharged from the hospital.

In the first year a course of 1 hour a week is given on human ecology during the first half-term. In the second half-term the time is devoted to biostatistics. The teaching includes three mornings in a village where the students take part in conducting a general health survey. The same occasion is used by the students for their laboratory work in making statistical calculations.

In the second year the students make a beginning in a long-term association with a single village family. They go to the village health center in groups of about 25, for a 2-hour practical session each week. The growing friendships with the families lead to a deeper understanding of the economic, social, and psychological problems of family life in rural areas.

A similar program is followed in the third year, but with greater emphasis on sanitation. In the following year epidemiology and the control of communicable diseases take the premier place; and, in the fifth, community health, including discussions on maternal and child health, industrial health, and school medical care, are introduced. The desirability of co-ordinated out-patient services is fully recognized.

Efforts are made throughout the curriculum to integrate the preventive and the therapeutic aspects of teaching. All students are required to serve a year's internship, including 3 months in a rural district, after their medical course of 4½ years has been completed.

These great reforms cannot be carried out within a short space of time owing to the difficulty of obtaining teaching personnel of sufficient quality and experience.

Australia.—Active planning of the under-

graduate curriculum has taken place in Western Australia. Many of the new features have much in common with modern developments in Britain and the United States, especially in the liaison between departments and weekly meetings of senior teachers. Great attention is paid to the more liberal aspects of the process of becoming a doctor. The students of the second and succeeding years are given a whole day each week in addition to Saturday and Sunday. True, it is not *quite* free; demonstrations, films, talks, etc., are offered, but they are not compulsory. The talks are often given by people of standing, outside the university circle—and in this way the students are brought into contact with fresh interests and points of view. Field work and family visits are encouraged. Toward the end of the period the hospital takes up more and more time. In the second year a coordinated course is given in human biology, with a comprehensive examination. By the third year the process of student selection is virtually complete, and from then onward the emphasis lies on the preparation for practice. The fourth year is based on the hospital, but pathology and microbiology continue, with autopsy demonstrations and so on. A short course in genetics is offered. The fifth year provides for the subsidiary disciplines, and at this time psychiatry and social medicine are taught by means of symposia. Public health work and other forms of group experience are continued in the sixth year, which completes the curriculum.

Europe.—The undergraduate curriculum in the U.S.S.R. presents many novel features which medical educators will watch with great interest. The course occupies 6 academic years, each extending from September 1 to July 1, with teaching period of about 36–38 hours a week. The students have 2 months' vacation in the summer and a winter holiday of 2 weeks.

Teaching in the first year comprises the basic sciences, together with philosophy, politics, and language—generally Latin and one modern tongue. Teaching of a similar kind, but with a gradual advance toward the application of the basic sciences, continues in the second year, and in the third there are clinical demonstrations of 3 hours given twice a week. The fourth and fifth years are devoted almost entirely to the clinical disciplines, and not less than 3 hours a day are spent in hospital. Out-patient polyclinics are also brought into teaching, in various less populous districts. These polyclinics are in fact an indispensable part of the practical teaching, since they are fundamental units of medical care in the Union. As a rule block systems of instruction are employed, e.g., 2½ months of medicine followed by 2 months of surgery, 1½ of gynecology and obstetrics, and 1 month of communicable disease. In their final year the students are designated as "Sub-ordinators" while in the hospitals, but continue to be under the jurisdiction of the medical teaching institution. Only 35 per cent of the course is occupied by formal teaching.

The basic instructional unit consists of a group of nine to ten students. State examinations are given at the end of the second and sixth years, and it is said that there are very few rejections. The students are trained in 81 higher medical schools, and all examinations are oral. In some ways the most interesting feature of the courses is the relatively sharp division of careers in the early clinical years into three groups, i.e., general medicine, pediatrics, and public health. Medicine is of course subdivided at the postgraduate stage into the generally recognized specialties.

Criticisms have been offered against the Soviet scheme on the ground that it creates special careers too early, at a time when the student's mind is not really made up. The second plea is that the division tends to make medicine into a technology rather than an art. One other noteworthy feature of medical education in Russia is the high proportion of women students, many of whom are subsequently largely employed in quasi-administrative work in clinics and health departments. It will take a number of years of dispassionate study to find whether these criticisms are valid and whether the

early division is in the line of healthy progress, in an age when so much factual material has to be absorbed—far beyond the competence of the individual.

In 1957, in Yugoslavia, the late Professor Stampar introduced a new teaching program in the medical faculty at Zagreb. The time previously devoted to anatomy was drastically reduced in favor of physiology and biochemistry. Selection was strengthened by an examination in the basic sciences. In the first year a new subject—"Introduction to Medicine"—was designed to give the young student a better orientation on the role of the physician and on the social factors in medical care.

One of the most striking new features, brought into the third year, was one semester of lectures and another of practical work, on nursing care, and on the work carried out by auxiliary staff. This has been found to improve an understanding of teamwork in practice, especially in rural areas. Elementary statistics, in the form of lectures and practical work, was also given in the preclinical period.

At the end of the third year the students sit for examination in microbiology, parasitology, and statistics; and, under the guidance of a teacher they undergo practical training in summer for at least 4 weeks, in order to become acquainted with rural life and its health problems. In this way the social background is better understood, and abnormal conditions, both individual and collective, are studied and interpreted.

At the close of the fourth year candidates have to work for a period of 4 weeks in a hospital, according to a plan arranged by the faculty. The ninth semester is devoted to clinical studies and to hygiene and social medicine. Education on these subjects is not limited to theoretical training; the students are sent out for practical work and come in contact with those with whom they will ultimately join in teams.

An innovation in the tenth semester is a combined examination covering pathology, pharmacology, and internal medicine. The object of this is to preserve the close relationship between these medical subjects, and avoid over-specialization.

The sixth year of medical studies consists of practical work and preparation for the final examinations for the degree of Doctor of Medicine.

THE BROADER TRENDS

Up to this point we have been regarding undergraduate medical education from the angle of the construction of a curriculum, and advances in subject-matter have been noted only incidentally. We should now conclude by a brief study of content rather than construction. What are the principal changes in recent years? The first of these is the increasing realization that medicine has become a social science and that students must therefore be taught about the community background of medical practice, as well as the medical needs of the individual. This was implied in the great movements of the first decade of this century in the direction of community responsibility for personal as well as environmental health, as represented in maternal and child health, the school medical service, and the prevention of the group scourges such as tuberculosis, venereal disease, and, in later times efforts toward the eradication of malaria, smallpox, yaws, and trachoma. It was also brought out in the growing sense of responsibility for the weaker groups such as the cripples and the infirm.

During the second decade of the century a striking advance has been made in the teaching of mental health to undergraduates. The old plan of a series of brief, formal lectures on mental disorder has been replaced by a far broader concept of social psychiatry. This in its turn has been strengthened by the realization that mental disease is a disease like bodily infirmities and not something apart; that hospitals can offer good and effective medical care for the sick mind; and that the causes of mental illness are generally to be sought in the family and community background of the patient.

In the third place it has become evident that the basic sciences, previously regarded

as the pelvis of undergraduate education, have now become its vertebral column. This has grown immensely in importance since the development of nuclear energy and, in its train, the increasing significance of radiobiology.

On the other hand there is a growing appreciation of the need for teaching students the essential features of general practice—a worthy career in which the vast majority of them will eventually engage. It is especially satisfying to observe the fine contribution that is being made by the Colleges of General Practitioners. The British College, and its associates and colleagues elsewhere, have undertaken notable work in the promotion of teaching and research, and in setting the highest standards for practice within the field of the general practitioner. As far as undergraduate training is concerned, complaints have been made that students are taught too much by those who are themselves engaged in narrow specialties; and for that reason the recent advances in the teaching of general practice to students—as conducted, for example, in Edinburgh, Manchester, and some of the London schools—is being studied with growing interest and appreciation.

It has also been urged that, if courses in language and the humanities, such as are being offered to students in their early medical course at Johns Hopkins and a number of other schools, are not made compulsory, they might as well not be given. This reminds one of the old story of the Bishop who was invited to preach in a well known English "Public School." When the service was over he congratulated the headmaster on the fine attendance of the boys. "Thank you," replied the headmaster, "you see, we have made attendance at chapel compulsory; it was a choice between having compulsory religion or no religion at all." "I am afraid my mind is very simple," answered the Bishop, "but I fail to appreciate the difference."

Medical education in the North American schools has benefited greatly by the system of accreditation of schools; and it is gratifying to see the acceptance and extension of these schemes. It would indeed be unfortunate if a plan of this kind were to be thwarted in any country merely by conflicting claims of national prestige. The part played by a University in medical teaching is very great in that it provides a general atmosphere of scholarship and stimulates the contacts of teachers in a wide variety of disciplines. The effect of the University background has the additional value of raising the demand for high standards of teaching and qualification.

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Medical Education and the International Health Organizations

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SUMMARY

In the Americas the close relation of the quantity and quality of medical education to the adequacy of health services has motivated PAHO/WHO to carry out activities for the improvement of medical education along two general lines: (*a*) measures affecting many schools, such as surveys, seminars, reports, and standards and (*b*) programs in national schools including consultation by visiting professors and award of fellowships for faculty members. Organization of a Medical Education Information Center has served to correlate efforts of a number of agencies interested in improving medical education in Latin America.

Collaboration among countries for the purpose of improving health conditions first resulted in a formal organization when the International Sanitary Bureau was established by the American Republics at the First Pan American Sanitary Conference held in 1902. An early function of the Bureau was to assist countries in the education of health services personnel, and this was spelled out more clearly in the duties assigned by the Pan American Sanitary Code, adopted by the 21 American Republics in 1924, and still in force as a duly ratified international treaty. The Code changed the name to Pan American Sanitary Bureau, which continues today as the Secretariat of the Pan American Health Organization, the name adopted for the parent Organization by the 15th Pan American Sanitary Conference in 1958.

In 1949 an agreement was signed under which the Pan American Sanitary Bureau serves also as the Regional Office for the Americas of the World Health Organization, which had come into being on a world-wide basis as a result of the International Health Conference held in New York in 1946. This made it possible for the international health program in the Americas, to which this paper will refer, to be carried on as a unified endeavor even though financed in part by the Pan American Health Organization and in part by the World Health Organization. For the sake of simplicity the term "Organization" will be used hereafter to denote the responsible authorities for the joint program. It should be noted that WHO now has 88 member countries throughout the world, while PAHO membership includes the 21 American Republics plus France, the Netherlands, and the United Kingdom, on behalf of their territories in the Western Hemisphere.

Preparation of physicians has, of course, high priority in any plan for furthering the training of all varieties of health services personnel. The program of the Organization in regard to the training of physicians has been directed chiefly at assuring that their training is of high quality. A paramount consideration has been recognition that adequately trained general practitioners are the heart of any sound program for health and medical care. Thus, a major objective has been to try to improve basically the kind of education every physician needs, whatever career he is going to follow.

The present situation regarding the supply of physicians in the Western Hemisphere

* Secretary-General.

is illustrated in Table 1, taken from the *Summary of Four-Year Reports on Health Conditions in the Americas* (3), prepared for the XV Pan American Sanitary Conference, held in San Juan in 1958. It is at these quadrennial Conferences that the countries of the Americas review the general state of the public health of the hemisphere; the problems of training of personnel receive special consideration.

about one-sixth were so new that they had yet to graduate their first class.

Besides the specific programs in the various regions of the world, such as that in the Americas with which this article will chiefly deal, WHO has made considerable progress in defining standards on a world-wide basis. A series of Expert Committee Reports have dealt with various phases of medical education ranging from a comprehensive review of

TABLE 1

NUMBER OF PHYSICIANS, WITH RATES PER 10,000 POPULATION, AND ESTIMATED POPULATION, IN THE AMERICAS, 1957

AREA	PHYSICIANS		POPULATION
	Number	Rate	
Argentina	25,500	12.8	19,857,654
Bolivia	850	2.6	3,272,764
Brazil	23,195*	3.8	61,268,423
Canada	17,400†	10.5	16,558,000
Chile	3,450‡	5.2	6,681,000
Colombia	4,500	3.4	13,227,480
Costa Rica	379	3.7	1,035,200
Cuba	6,421	10.0	6,392,964
Dominican Republic	411	1.5	2,698,126
Ecuador	1,325	3.4	3,890,000
El Salvador	325	1.4	2,350,201
Guatemala	542	1.6	3,429,600
Haiti	300‡	0.9	3,383,762
Honduras	365	2.1	1,770,000
Mexico	18,058	5.7	31,426,190
Nicaragua	464	3.5	1,341,322
Panama	286§	3.1	911,100
Paraguay	857	5.2	1,638,000
Peru	3,286	3.7	8,805,000
United States	218,000†§	12.8	170,333,000
Uruguay	3,116	11.6	2,690,000
Venezuela	3,689	6.2	5,904,803

Source, except as indicated: *Summary of Four-Year Reports on Health Conditions in the Americas*, PAHO/WHO, 1958.

* 1954.

† Estimate.

‡ World Directory of Medical Schools, WHO, 1957.

§ 1956.

Variation among the countries, as shown in Table 1, is very great, and, as is not uncommon in other parts of the world also, the countries with the highest rates for death and disease have the lowest number of physicians in relation to population. Since in the Americas the greatest need appears to be in Latin America, the major efforts of the Organization have been directed to that area. At the end of 1958 there were 88 medical schools in existence in the Americas outside of the United States and Canada. Of these,

the scope and plan of studies (Technical Report Series No. 69, 1953) to the recent report on the Preventive Aspects in the Teaching of Pathology (in press) and Introduction of Radiation Medicine into the Undergraduate Medical Curriculum (TRS No. 155). WHO has also published two editions of a *World Directory of Medical Schools* (6), the more recent edition, 1957, including a brief review of the general teaching plan for medicine in each country. An *Annotated Bibliography in Medical Educa-*

tion (7) has just appeared, as well as a Monograph on the *Teaching of Preventive Medicine in Europe.* WHO has also made excellent use of teams of visiting scientists to bring a variety of talents recruited from several countries and regions to a particular country interested in reappraisal of medical education.

In Latin America two main approaches have been used by PAHO/WHO in assisting improvement of medical education—general measures designed to affect large numbers of schools and specific programs in a limited number of individual schools. The former have included surveys, establishment of standards, distribution of relevant scientific publications, and organization of conferences and seminars. The latter have been concerned chiefly with award of fellowships to key faculty members, particularly deans and professors of preventive medicine, consultation visits by staff members of the Organization and by short-time consultants, small amounts of teaching supplies and equipment, and stimulation to self-evaluation of the school's teaching program and activities. An important corollary activity has been the establishment of a central unit for assembling reports on what the various agencies are doing for medical education in Latin America.

Among the general measures a significant landmark was the holding of two seminars on the teaching of preventive medicine, the first in Viña del Mar, Chile, in October, 1955, and the second in Tehuacán, Mexico, in April, 1956. Representatives of almost all the medical schools in Latin America were in attendance at one or the other of the seminars, the general pattern of representation being presence of the dean and the professor of preventive medicine.

These meetings were the first occasion for contact among all the medical schools of the area, even though eighteen of the twenty Latin American Republics have a common language, Spanish. To a considerable extent the seminars were patterned after the Conference on the Teaching of Preventive Medicine held at Colorado Springs in 1952 and the European Conference held in Nancy, France, the same year. An important difference was the attempt to have the Dean of every medical school present at the Latin American Seminars.

The seminars were carefully prepared by (*a*) prior circularization of basic materials for reading and advance study; (*b*) wide distribution of the questions to be considered at the seminar so that they might be thoroughly discussed within each faculty to permit the participants to bring more than their own views; and (*c*) visits to most of the schools by one of two specially appointed consultants for the seminars. As a result, the meetings themselves were unimpeded by formal presentations and were characterized by vigorous, well directed discussions covering the broad fields of content and method of instruction, organization, and relationships of the teaching department of preventive medicine, and relationships between the medical school and the community.

Highlights among the conclusions were: teaching of preventive medicine should be a concept pervading the entire medical curriculum, entering into all subjects, not just the course in preventive medicine; emphasis should be placed on using the family unit as a focal point for teaching, by having the student act as observer and medical adviser for a limited number of families in the community; there should be a separate department of preventive medicine responsible for its own teaching and for coordinating the preventive aspects of teaching in other departments; the professor of this subject should have a solid foundation and experience in public health as well as clinical medicine; the community constitutes a vital laboratory to develop in students the concept of the relationship between the individual and his environment; time spent by students in obligatory rural work at the end of their academic training may be made a useful educational experience, as well as providing good service to the community, when the medical school shares in the responsibility for management of this program. Both seminars felt it necessary to go somewhat beyond their main sub-

ject matter in order to make recommendations regarding the general program of medical education, noting particularly that size of student body must be adjusted to possibilities for sound teaching and that admission must be limited to really qualified applicants.

A final report on the seminars was published in the *Boletín de la Oficina Sanitaria Panamericana* in July 1956 (4) and was distributed widely. Evidence that the recommendations of the seminars and the lessons learned in the free discussions were being put to full use has come from many sources. Individual schools and countries have initiated specific plans which have been the outgrowth of the recommendations. Curricula have been reorganized, and increased attention has been paid to staff training.

In another field of medical education, that of pediatric education, which is by its very nature closely linked to the problem of prevention in general, the Organization's approach was somewhat different, taking the form of a survey of the teaching program and teaching staff, similar to those carried out in the United States, Canada, Australia and New Zealand, and in Europe. Pediatrics is a well defined entity of the clinical curriculum, which can be measured and for which certain standards have been set. Furthermore, conclusions regarding pediatrics can affect the total clinical curriculum.

Objectives of the survey of pediatric education in Latin America were to assemble a clear picture of present-day pediatric education, ascertain gaps and needs, provide an instrument for self-evaluation, help schools learn from one another, and bring pediatric education closer to the community. The survey was carried out in collaboration with the American Academy of Pediatrics, which has a great many of its members in District IX (Latin America), and also with the International Pediatric Association.

A simplified questionnaire was distributed to every medical school in the Americas, outside the U.S.A. and Canada. Through follow-up visits by a consultant and members of the regular staff of the Bureau, it was possible to obtain answers from all the existing schools. Analysis of the material brought out some basic information of general significance to medical education. Ten per cent of the schools had only 13 per cent of the students. It appeared obvious that some schools were too large for the individual attention necessary for sound medical education, while other schools were probably too small to support the kind of budget necessary to give students well balanced coverage. Extremes were 720 students in pediatrics in one school and six in another.

Teaching programs were extremely variable, and the majority of schools paid insufficient attention to the problem of practical instruction. Furthermore, the great majority of the schools undertook less than the 300 hours of instruction in pediatrics, which has been indicated as a possible minimum by the WHO Study Group on Pediatric Education (8). Only two schools reported full-time teachers in pediatrics. While most schools had no shortage of hospital beds for instruction it was disappointing that 20 per cent of the schools did not provide individual work with outpatients—a keystone in training for pediatric practice. The summary information and comparative tables were, of course, anonymous, but each school has received confidential information indicating its relative position to serve as a stimulus and as a basis for improvement. A complete report on the survey was published in Spanish in the *Boletín de la Oficina Sanitaria Panamericana* in April, 1958, and in English in *Pediatrics* (5) in July, 1958.

Any survey is effective only insofar as it produces real changes for the better in the schools which have participated. Evidence is accumulating that such improvement is taking place. In several schools with inadequate teaching hours the survey has been used to demonstrate to deans and curriculum committees what most schools considered a reasonable proportion. More vigorous attempts to vitalize teaching have been reported from schools in widely separated places.

The Dean of one school, which suffered

from inadequate hospital beds, even though ample clinical material could have been admitted, was able to use the Survey to persuade the Rector of the University of the need for a special plan, which involved relatively little expenditure, to help solve the problem.

Reorganization of the teaching program has been the subject of discussion within a number of schools. A corollary of this was the organization of a Seminar on Pediatric Education held in Paipa, Colombia, in November, 1958. To this Seminar, designed for the seven medical schools in Colombia and the three in Venezuela, were invited the Deans, the Professors of Pediatrics, one to three other members of the Pediatric Department, several professors of preventive medicine, and representatives of the national departments of maternal and child health. With the use of a technique modified from the Seminars on the Teaching of Preventive Medicine the discussions were based heavily on the findings of the survey and the recommendations of the WHO Study Group on Pediatric Education. It is too soon to measure the long-range effect of these seminars, but it is already clear that they have started a ferment for improvement in the participating schools.

Stimulated by the success of the survey on Pediatric Education, the Latin American Association for Physiological Sciences invited PASB/WHO to collaborate in carrying out a similar study of the situation in the teaching of basic sciences in Latin America. The Bureau prepared the questionnaire and has made a preliminary analysis of some 50 replies which have been received thus far. Again the stimulus to the individual schools to examine and improve their own situation has been noteworthy.

In addition to the intercountry seminars and congresses which have been mentioned above, the Organization has also collaborated with medical education meetings on a national basis. Outstanding examples have been the two national conferences held in Colombia, the first at Cali in December, 1955, and the second at Medellin in December, 1957. At both seminars representatives from all the seven medical schools in the country met in separate discussion groups: morphological sciences, physiological sciences, pathology, preventive medicine (including microbiology), internal medicine, surgery, pediatrics, obstetrics, and psychiatry. There was also a special meeting for deans and, at the second seminar, a special group for student representatives. Vitality of the discussions and clarity of recommendations were evidence of a forceful movement to improve medical education in the country, a conclusion borne out by the data presented in the second seminar demonstrating substantial and satisfying progress.

A national meeting in Brazil, held as part of the First Congress of the Brazilian Medical Association, constituted an important collaborative step between the organized medical profession and medical education. Financed by a grant from the Rockefeller Foundation, and with staff of the Organization collaborating, the meeting followed the pattern of the Seminars on the Teaching of Preventive Medicine. It set out to review the broad problem of medical education in Brazil and to attack the most significant questions of curriculum content, teaching staff, selection of students, and related problems. In Argentina, a national meeting held in November, 1957, strove to set the base for the drastic reorganization of medical education which is planned for the country.

In the 4-year period, 1954–1957, a total of 30 schools in thirteen countries have received some form of help from the Organization through direct technical advice, fellowships, or supplies. Fellowships have been awarded chiefly to faculty members in medical schools in order that they might study and observe educational methods in other schools with problems similar to their own.

The Seminars on Preventive Medicine recommended that medical statistics be included as one of the subjects to be taught in the field of preventive medicine and that the schools of medicine should have the services of a statistician for such teaching and for ad-

visory services. Resultant productive activities have included a South American Conference on the Teaching of Medical Statistics (1), São Paulo, Brazil, in 1958; a Round Table on the Teaching of Biostatistics in Schools of Medicine (2), San Luis Potosí, Mexico, 1958; consulting visits by professors of biostatistics to several medical schools.

Among the fundamental mandates assigned to the Organization by its governing bodies the function of coordination ranks high. In the field of medical education the presence of a number of agencies giving help internationally made some form of coordination essential. In 1952, therefore, a Medical Education Information Center was started at the Pan American Sanitary Bureau to bring together information from all agencies interested in the improvement of medical education in Latin America. These have included chiefly the Rockefeller Foundation, the Kellogg Foundation, the International Cooperation Administration and the Public Health Service of the United States, the Institute of International Education, and the World Medical Association. Chief purposes of the Center have been to avoid duplication, disclose gaps which needed to be filled, and mutually support efforts to raise standards of teachers and teaching. Discussions of the differing emphases followed by the several agencies had led to a more effective approach in regard to a number of schools. MEIC has functioned chiefly through the issuing of quarterly reports on fellowships awarded by the various agencies and through the holding of one to two meetings a year at which a detailed review of activities, country by country, is taken up. The information has been collated to give a total picture of fields covered by fellowships activities.

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MEDICAL EDUCATION FORUM

Editorial

AN INTERNATIONAL SALUTE

The present number of the *Journal of Medical Education* has been developed in relation to the Second World Conference on Medical Education which convenes in Chicago on August 30–September 4, 1959. It seemed that it would be timely to gather articles describing some of the exciting developments in medical education throughout the world today into one publication. Obviously, it has been impossible to cover every country or every new program. We have endeavored to strike some of the high points, based upon our rather limited knowledge of changes in other lands.

It is particularly appropriate that the *Journal* should undertake such a program, being the only publication exclusively devoted to the problems of medical education. As the manuscripts, which are filled with intriguing material, have flowed in from the four corners of the earth, it has become increasingly evident that this journal should endeavor to play an ever larger international role. The wonderful cooperation that we have enjoyed in preparing this special number is solid evidence that medical educators around the world are eager to learn and tell about the changing mosaic of medical education.

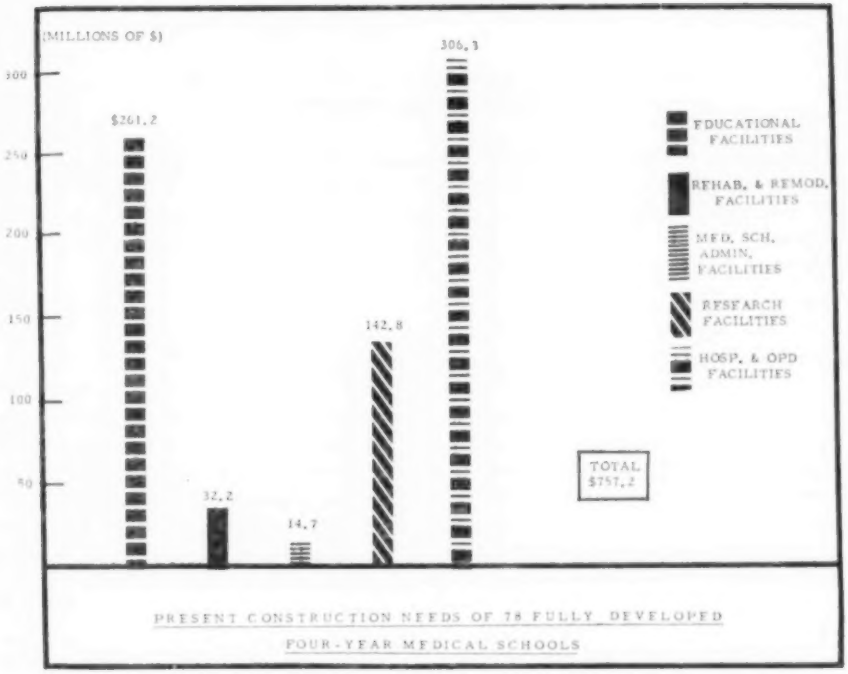
Medical schools are springing up in many areas. In some countries these schools are a vital resource for the preparation of physicians urgently needed in a broad effort to improve living standards. In others, new or expanding medical schools are concerned with the need for physicians in line with anticipated population increases. Some medical schools are tackling the problems of revising and reviewing educational programs to bring them into line with more modern concepts of the curriculum and the educational process.

The articles in this special international number of the *Journal* are vivid testimony that medical education around the world is a dynamic force. We salute the Second World Conference on Medical Education and the medical schools of the world!

JOHN Z. BOWERS, M.D.
Editor-in-Chief

Datagrams*

CONSTRUCTION NEEDS



In a recent AAMC survey, seventy-eight fully developed four-year United States medical schools indicated a need for $757,200,000 in construction funds between now and 1965 for the building of new teaching, research, hospital, outpatient, and administrative facilities, as well as for the remodeling and renovation of existing plants.

The above graph provides a breakdown of this estimated need for construction funds exclusive of student dormitories, recreational areas, and other facilities not directly related to teaching programs.

* Submitted by the Division of Operational Studies of the AAMC. Source of information will be furnished on request.

STUDENT DETAIL MEN

Forty students throughout forty-nine four-year United States medical schools were known to be working as pharmaceutical detail men during the school year, according to information received in the 1958 questionnaire of the Liaison Committee on Medical Education. Deans from thirty-three schools, responding to the same questionnaire, reported a knowledge of forty-five students who were similarly employed during the summer vacation.

STUDENT EXTERNS IN HOSPITALS NOT AFFILIATED WITH MEDICAL SCHOOLS

From the same questionnaire of the Liaison Committee on Medical Education, information was obtained on the number of medical students throughout thirty-eight schools who were employed as externs in hospitals not affiliated with medical schools: 1.7 per cent of the Sophomore students; 8.5 per cent of the Junior students, and 14.2 per cent of the Senior students were so employed during the 1957–58 academic year.

ARE FEWER MEDICAL STUDENTS WORKING?

It appears that fewer medical students were employed during the academic year 1957–58 than in the two immediately preceding years. The dean's offices of thirty-nine United States medical schools recently reported that 27.4 per cent of the students were employed during 1957–58. This compares with 35 per cent who were employed in 1956–57, as reported in "Ecology of the Medical Student." Approximately 49 per cent of the students were earning part of their medical school costs in the school year 1955–56, according to a sample survey of forty-four schools conducted by the National Opinion Research Center.

TUITION FEES GOING UP

Since 1939 the average annual tuition fee for medical schools in the United States has increased 114 per cent. Thirty-two per cent of the increase occurred between the years 1950 and 1956. During this same six-year period, the average family income increased 30 per cent, and the cost-of-living index increased by 16.9 per cent.

Early reports from a few medical schools indicate that some schools will raise tuition fees again this year.

Reports

CHINA MEDICAL BOARD OF NEW YORK, INC.

HAROLD H. LOUCKS, M.D.*
China Medical Board, New York, N.Y.

The China Medical Board of New York, Inc., had its origin as a division of The Rockefeller Foundation, which was organized in 1914 as the China Medical Board to care for the developing interests of the Foundation in China. In 1915, the Foundation purchased and assumed support of the Union Medical College in Peking, which had been founded in 1906 by a group of Protestant missions. The institution was renamed the Peking Union Medical College, and its reconstruction, development, and support gradually became the primary, although not the exclusive, interest of the Board.

In 1928, the Board was incorporated as an independent organization, separate from the Foundation, under the control of a self-perpetuating Board of Trustees, who serve without compensation. The Rockefeller Foundation endowed the new organization and transferred to it ownership of the land and buildings occupied by the Peking Union Medical College. From then until the outbreak of the Pacific War in 1941, the Board devoted its entire income, with the assistance of supplemental grants from The Rockefeller Foundation, to the support of the College, where small classes of carefully selected students were admitted to a program of high standard, oriented toward the concept that the greatest contribution the West had to offer Eastern civilizations was an example of the manner in which objective observation and inductive reasoning could be combined to achieve scientific progress. In the two decades of its existence, approximately 350 prospective teachers were graduated.

During 1942–45, while the College was occupied by Japanese forces, the Board carried on a program of aid to medical institutions in Free China and supported the College Nursing School in temporary quarters in Chengtu. With the recovery of the property in 1945, the Board's income again was devoted wholly to the reorganization and support of Peking Union Medical College.

In January, 1951, the College was nationalized by the Peoples Government of China, which assumed complete control of the institution and its property in Peking. Since that time all relationships between Board and College have remained severed.

Subsequently, the Board revised the geographic area of its interest in medical and nursing education to include South Korea, Japan, Taiwan, Hong Kong, the Philippines, South Vietnam, Thailand, Burma, Malaya, and Indonesia, and, in general, has since pursued a policy of attempting to assist at least one institution in each of these countries to achieve as rapidly as possible proper status as a teacher-training center for students from that particular nation. Limitation of resources has not permitted the Board to consider assistance to all medical schools within this geographic area.

* Director.

The China Medical Board of New York, Inc., is a grant-making agency, and does not itself engage in research or operations. Under the terms of its charter, it is empowered to make grants only to medical or nursing schools. Proposals for aid to governmental or other health programs, hospitals, or educational projects unassociated with the teaching program of a medical college cannot be considered. Grants usually take the form of allocations for fellowships, visiting professorships, teaching supplies and equipment, books and journals, research programs, and, more rarely, for buildings. It has not been possible for the Board in any instance to consider routine budgetary assistance. Particular emphasis has been placed on the development of medical school libraries and the reorganization of teaching programs. In recent years arrangements have been made to insure that at least one or more copies of the *Journal of Medical Education* reach every medical school within the boundaries of the geographical area of the Board's interest.

The Board's headquarters and only office are in New York. Its program is administered, under the guidance of its Chairman and Board of Trustees, by its Executive Officers, who maintain direct contact with the various Far Eastern schools through frequent visits to that part of the world.

During the period July 1, 1951, through June 30, 1959, the Board appropriated approximately $5.5 millions to Asian schools in support of the above program. Two hundred ten fellowships were awarded for study in the United States or Europe within this time, and 32 visiting teachers or consultants were sent to the Orient. Fellowships have been approved only for graduate students recommended by the Dean of the school from which the individual comes, and on the assurance that a teaching post will be available for him at the completion of the fellowship period.

The China Medical Board of New York also has given occasional support for projects more or less directly related to its Far Eastern program but carried on in, or administered by, American medical schools. Conferences for foreign medical scholars studying in the United States, a program of field experience for teachers of Parasitology and Tropical Medicine, an experimental approach to the training of nurse-midwives, a project in filariasis control can be cited as examples within this area of the Board's interest.

THE COMMONWEALTH FUND

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The Commonwealth Fund's activity in medical education at the international level is limited and is conducted as part of its established fellowship programs. These are a domestic program of fellowships and awards in the health field and The Harkness Fellowships administered by the Division of International Fellowships.

The domestic health fellowship program provides for 25–30 awards each year, most of which are to Americans, and includes support for foreign travel and study in the majority of instances. A small number of awards in this program are available to mature, experienced British medical educators for study of developments in medical education in the United States on the recommendation of the Association for the Study of Medical Education (London). Under unusual circumstances an occasional award may be made to a medical scientist or teacher from Europe or elsewhere. The awards to Americans are for post-doctoral study, and the emphasis is on established persons who seek free time for creative activities and writing.

The Harkness (International) Fellowships of the Commonwealth Fund are open, in the United Kingdom, to graduates in all fields of study and often include, among 30 annual awards, a few who are qualified in medicine or related disciplines. The awards provide for 12–21 months' study and travel in the United States.

* Executive associate.

W. K. KELLOGG FOUNDATION

M. R. KINDE, M.D.*
W. K. Kellogg Foundation, Battle Creek, Michigan

The W. K. Kellogg Foundation, located in Battle Creek, Michigan, was established in 1930 and is chartered "for educational and charitable purposes." The fields of activity of the Foundation are determined by its Board of Trustees, which revises the emphases from time to time to fit changing economic and social conditions. Its principal interests today—to improve agriculture, educational, and health services to the people—allow a broad and flexible application of its resources. However, to avoid spreading the resources too thinly, limitations are placed on the geographic scope and the fields of interest by the Board of Trustees.

The Foundation operates no programs of its own but assists programs of universities, institutions, and specialized agencies. With its emphasis on the application of knowledge and service to people, attention is given to programs designed to prepare leaders, develop education, and improve services in health, education, and agriculture for the benefit of the general population.

The Foundation is chiefly interested in pioneering or experimental projects and seldom aids the operational phases of established programs. Activities of the Foundation are largely limited to the aid of programs concerned with the application of knowledge rather than its creation through basic research. It does not support research per se but occasionally finances studies with anticipated immediate application for the public welfare or essential for new or existing programs. Ordinarily the Foundation does not make expenditures for capital facilities, publications, or films unless they are directly associated with a project the Foundation is already aiding. The resources of applicants for aid are a factor, for the Foundation avoids encouragement of any program beyond the means of the community or agency eventually to support.

The objectives of Foundation-supported overseas activities in the health fields are to help improve the health of the people of various countries through upgrading the quality of education in their professional schools and through special projects related to health services, and to foster international understanding through a sharing of experiences by professional people of the United States and the various countries through fellowships and exchange of personnel. In reviewing projects for support, the Foundation gives consideration to the country's resources, evidence of initiative and interest on the part of the staff of the professional school, a willingness to provide leadership and accept responsibility for the project submitted, and the probability of the projects' becoming permanent through "take-over" if they prove to be successful.

At the present time the Foundation is supporting health programs in Canada, Mexico, and Central and South America. The agencies receiving aid include medical schools, dental schools, nursing schools, hospitals, and public health schools. Foundation expendi-

* Director, W. K. Kellogg Foundation.

tures for a recent year were distributed as follows: United States, 76 per cent; Latin America, 11 per cent; Canada, 5½ per cent; and Europe 7½ per cent.

FELLOWSHIPS

Foundation fellowships are awarded not to individuals but to universities, institutions, or agencies as a part of over-all programs of cooperation. The first international fellowships were awarded in 1941. Awards, in the fields of dentistry, hospital administration, medicine, nursing, and public health, and in the basic medical sciences, are largely restricted to the Western Hemisphere, principally to universities in countries of Latin America.

Fellowship awards are designed to achieve the following objectives: to improve professional education and services and stimulate research; to enhance the opportunities available for professionally qualified people to observe and study counterpart developments in the United States; to encourage understanding between nationals of participating countries; and to stimulate the international exchange of ideas and experiences in those fields within the scope of the Foundation's interests.

Each fellowship, awarded to the cooperating university, institution, or agency, includes both sponsorship and financial assistance to provide appropriate training for a selected Fellow to improve his specialized knowledge. In most cases, the Fellow is provided with at least an academic year in the United States. Awards are tenable in the United States only, with the rare exception made in the interest of a cooperating agency's particular needs, to provide training in the country of origin or in a third country. Occasionally, short-term fellowships are provided for special study and observation.

Candidates are nominated in their own countries by the university, institution or agency with which the Foundation is cooperating. The individual candidate is interviewed by a representative of the Foundation who discusses the interests of the nominating agency and the particular needs of the candidate within this framework. The candidate's future career with the cooperating agency and an appraisal of the facilities which will be available to him on his return are considered. Preliminary evaluation is made of the candidate's personality, background and experience, and, where appropriate, English language facility.

A candidate must be: (*a*) a graduate of a recognized university or professional school; (*b*) of superior academic standing; (*c*) under 35 years of age; (*d*) able to speak, understand, read and write English well; (*e*) assured of a post-fellowship position and agreed to accept it; (*f*) conversant with the general culture, history, customs, and resources of his own country.

A candidate who is considered qualified is invited through the nominating agency to file an application. In some cases, in non-English speaking countries, a second interview may be arranged to confirm the English language proficiency of a candidate otherwise well qualified. All final selections are made at the Foundation headquarters in Battle Creek.

The candidate's proposed program of study and preference for placement in an American educational center, and other information thought to be of assistance to the candidate, are discussed with a representative of the Foundation. The details of each program of study are made final only after arrival at the assigned educational center.

The final selection by the Foundation places emphasis upon the following: the professional and personal qualifications of the candidate; the need for and probable utilization of the experience to be provided by the fellowship; and the candidate's potential participation in the improvement of the teaching, research or service program of the nominating agency.

As soon as each award has been decided by the Foundation, arrangements are made for suitable placement in an American educational center, based upon the Fellow's needs and, where feasible, his preferences. A letter of award describing these arrangements is sent to the nominating agency. There follows notification, including initial travel instructions, to the newly appointed Fellow.

The responsibility for the supervision and welfare of the Fellow while in the United States is the joint concern of the Foundation and the educational center where he is studying. In some cases, the responsibility may be shared with other professional organizations. Approximately fourteen fellowships are awarded each year to physicians.

Fellowships include the cost of travel from the Fellow's home to his place of study in the United States and return, a living stipend to which a dependent allowance is added if his wife and children come to this country, tuition costs, the cost of required books and necessary expenses of medical and hospital care. In addition, the expenses of attending at least one scientific meeting are included. Usually at the time of the Fellow's return home expenses are provided for visits to other medical centers than the one in which he received his training.

ASSISTANCE TO PROGRAMS

Assistance to professional schools for laboratory and teaching equipment is usually closely related to the fellowship program. After Fellows are given specialized training and return to their own country, consideration is given to their future roles in teaching and research. The work of their particular departments is carefully analyzed, and, if equipment is needed, the Foundation may assist with its purchase. As a general policy, more emphasis is given to equipment specifically to be used by former Fellows for teaching rather than for research.

In supporting a department of a professional school, the Foundation sometimes helps with salaries with the purpose of developing the concept of full-time personnel. The provision of salaries is usually related to a broad plan of departmental organization, and the help is ordinarily given for 3–5 years. Agreements are developed with the schools to take over the salaries as Foundation support is withdrawn.

Consultation is provided for the various schools through short-term travelships to the United States for selected members of their faculties and through visiting professors from the United States who provide consultant services in the particular countries. This service is always closely related to actual projects supported by the Foundation and to problems of Fellows who have returned home.

Some examples of cooperative programs in Latin American medical schools receiving financial support from the Foundation are briefly described in the following paragraphs.

Assistance is being given for the establishment of clinical clerkship programs in the junior and senior years at the medical schools of the Univerity of Antioquia in Colombia, the University of Bahia in Brazil, and the University of San Marcos in Peru. These schools received financial support after completion of a careful study of the clinical clerkship as part of the curriculum. A number of Fellows who had been trained in the United States contributed to the formulation of objectives and procedures. The support in most instances is for a 5-year period and includes assistance toward the salaries of full-time teaching personnel and especially for teaching residents. Funds also provide for necessary clinical and teaching equipment. In each school emphasis has been placed on the development of

student laboratories which were also equipped through the grant. Foundation help will gradually be lessened over the period of support, and the university in each instance has agreed to increase its financial responsibility toward complete underwriting of the project. The plan for this type of training has included revision of clinical records and increases in the time alloted for students to study patients, and has integrated the students' work on the wards with activities in the out-patient and basic science departments.

Considerable emphasis has been placed by several Latin American schools on improvements in basic science teaching. In addition to fellowships for basic science teachers the Foundation has supported their departments through salaries and equipment. An example is the University of San Marcos in Lima, Peru, where the University supplied funds for the construction of a new biochemistry laboratory building and the Foundation assisted with faculty salaries and the purchase of teaching and research equipment. In this instance teaching manuals and equipment lists were developed by the professor during his fellowship in the United States. In the new medical school at Cali, Colombia, the Foundation over a period of years has given twenty fellowships for members of the faculty. The heads of the departments of medicine, surgery, anatomy, physiological sciences, pathology, and obstetrics were trained in the United States through Foundation support. Similarly, help to initiate a pilot teaching project in pathology at the Medical School of the University of Mexico is demonstrating the value of student participation in the practical work of the department. Emphasis there is being placed on the clinical aspects of pathology as well as on gross and microscopic studies of tissues by the students. Similar pilot projects have spread to the other basic sciences resulting in their improved correlation with one another and with clinical teaching.

An example of help to a project not directly related to a medical school is the Institute of Nutrition of Central America and Panama, with headquarters in Guatemala City. The Foundation has been cooperating with INCAP since its inception in 1949 and to date has given 24 fellowships for the research staff and has provided $95,674 for equipment. Recently a grant was made to strengthen the educational program of INCAP for disseminating the research findings on indigenous food values and nutritional problems throughout the participating countries of Central America.

MEDICAL EDUCATION ACTIVITIES OF THE ROCKEFELLER FOUNDATION

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In recent years, through 1958, the program in medical education of The Rockefeller Foundation, both within the United States and in other countries, has emphasized the continued incorporation of modern scientific advances into clinical and public health teaching and practice. The Foundation has been aware of the related problems of the adaptation of educational and scientific developments to national and regional cultural patterns. Medicine, like all forms of education, cannot have a static pattern, but must constantly change in response to the evolving requirements of society and the expanding patterns of knowledge.

In most countries of the world there is an absolute numerical insufficiency of medical manpower. Often this is further associated with a qualitative inadequacy in training. In this respect there is probably no country where the members of the medical profession are entirely satisfied with the quality of their own educational system. There is a general discontent with the gap between social needs in the medical and health fields and the effectiveness and quality of the available resources. From within the profession itself there is a drive to improve the performance in terms of medical and health services.

To meet the needs, it has seemed clear that the development of medical personnel in a geographic area must take place within the region itself and also within the framework of its own educational resources and patterns. External assistance can be indispensable in encouraging the emergence of strong educational centers whose academically oriented graduates may, in turn, form the faculties of other medical schools. The development of primary teaching and research centers has been the subject of special Foundation concern in Latin America and India, and to a limited extent in Africa. Certain institutions, outstanding because of their national and regional positions, which have undertaken to encourage an increasing proportion of their graduates to prepare for careers in teaching and research, have received broad support not only for the basic sciences but also for the departments devoted to clinical teaching and postgraduate activities.

With the development of modern curricula and teaching methods, it is expected that the student will develop an appreciation for the scientific basis of medicine and for the diffusion of the scientific approach into all levels in the preparation of the physician. It is well recognized that the medical curriculum cannot result in the production of a finished physician, but that it can and should establish the general competence in medicine upon which may be based further training leading to special capabilities. Inevitably such an approach also has its impact upon, and to some extent is limited by, the premedical education system of the region concerned. Consequently, increasing attention must be paid to the quality and scope of premedical education.

To exploit further the educational resources of a country, fellowship programs on a national basis may enable a young faculty member from one institution to enjoy 1 or 2 years

of special training in a distinguished department of another university in his own country. Experimental programs of this kind in Brazil and India appear to indicate this to be a highly significant method of utilizing a country's own intellectual resources.

Broad institutional support along these general lines has been especially emphasized in selected institutions in Brazil, Chile, Colombia, and India. Less inclusive assistance on a departmental basis has been given in Argentina, Belgian Congo, Canada, El Salvador, England, Japan, Lebanon, Mexico, Scotland, and Turkey. In all the schools, fellowship study in the United States and other countries has been an essential element in the development of increased academic competence.

Closely related to any program of strengthening the faculty of a medical school is the development of its library. Special training for librarians, grants to increase the library's resources, and assistance in improving its operations are of broad benefit both to the medical faculty and to the student body. Special support for library development has been given to a number of overseas institutions.

The effort to bring effective teaching to the bedside of the patient also serves to emphasize the importance of good nursing services. The patterns of nursing education, like those of medicine, are substantially affected by the structure of the societies concerned. Nursing especially must be developed with reference to the social status and educational position of women, which may vary substantially from country to country. Adequate programs of nursing education require an accurate knowledge of both resources and trends, and special surveys are as essential to the development of a sound educational system in nursing as they are in clinical medicine.

The implementation of the Foundation's overseas medical education program has been largely in the hands of staff members in residence in the various countries. Field offices have been maintained in Rio de Janeiro, Brazil; Santiago, Chile; and New Delhi, India. Other field representatives have served in Mexico City, Mexico; Tokyo, Japan; and Baghdad, Iraq. Additionally, staff members have given special services to the Population Council, the World Health Organization, and the University of Puerto Rico.

Within the United States, the Foundation's program in medical education has followed two major lines. One has been support to departments in United States medical schools which are active in the overseas development of medical and nursing education. The other has been the encouragement of explorations into problems of medical education especially relevant to the United States itself. Toward this end, support has been given to various faculty studies leading to the incorporation into the medical curriculum of new scientific advances in such fields as radiobiology and human genetics. Support has also been given to special studies on the development of educational content responsive to the changing patterns of disease and the social requirements of the next 20 years.

In several universities studies have been directed to the achievement of greater economy of time in the preparation of the physician. Increasing the length of the academic year, adaptation of both the premedical and medical curricula to the capabilities of the selected student body, and the earlier acquisition of clinical responsibility by the medical student, all appear to be practical ways in which to decrease the time requirements in terms of years in the preparation of a physician, while adding a corresponding increment to his useful professional life.

A correlated undertaking has been to encourage interdisciplinary programs at an advanced level in the broad health and social aspects of nuclear energy. The atomic energy

industry, already a major economic factor in the United States, will inevitably present problems of the most complex character involving not only medicine and public health, but concomitantly important segments of law, economics, engineering, and social science. To produce the specialists required for leadership and public administration in the new field implies resources which exist only in our universities. Attention has therefore been given to a phase of postgraduate education which extends beyond the usual boundaries of medicine and public health into many other divisions of the university.

Of importance commensurate with the scientific developments of this period is the concern with the effectiveness with which modern medical knowledge is brought to bear upon the health problems of individuals and communities. The organization of medical and health services will require increasingly intense examination in the light of the shifting patterns of disease within our population and the changing expectations in our society concerning standards of professional performance. The medical student must be adequately prepared now for his professional responsibilities of one to two decades hence. Pilot studies directed toward improving the organization of health services have been conducted by the Government of Puerto Rico; the results of this investigation and experience should be of substantial value in the development of practical standards of service in the health field.

Letter to the Editor

As Chancellor of the University of Shiraz and Dean of its Medical School I cannot express too strongly our appreciation for your generosity in supplying us with copies of the *Journal of Medical Education*. It has great value for us, because this medical school, situated in southwestern Iran, is making great efforts to bring modern medical education into this country which sadly lags at the levels of medical science and research, patient care, and public health measures.

For instance, I will take the province, Fars, of which the historical city of Shiraz is the capital. There is an estimated population of two million in this area, which comprises 100,000 square miles. The city of Shiraz has an estimated population of 200,000. Approximately twenty doctors serve the entire population outside of the city. There is also very little in the way of organized public health services at a medical level. In some of our poorer villages sanitation engineers are beginning the long task of showing the people how to improve sanitation and educating them as to why these measures are necessary. Remedies for disease, however, still come largely through "home" treatments handed down from generation to generation. Nevertheless, experience has shown that these people, as poor and uneducated as they are, will flock to the medical doctor for advice and medication whenever the opportunity is offered. Thus, our major goal is to produce more educated physicians.

American-type medical education, teachers, and the facilities and equipment for providing it are beginning to come into existence in Iran. Our past experiences in medical education have proved inadequate in dealing with the medical and health problems we face today. Basically, our rigid system of education, in force in Iran for many decades, has proved inadequate for the best education of professional people, and only within the last few years have Iranian leaders recognized and begun to take action for revising and modifying the old system by introducing Anglo-American methods, with emphasis placed on making the student think for himself. Progress has necessarily been slow because of lack of funds and the ability to plan soundly and then implement the plans. The United States and some of her dedicated people in professional fields have, however, helped us greatly to make a start in the right direction. But we realize we will need continued assistance from such individuals, in addition to financial aid, for a number of years before there are enough well trained Iranians to carry on by ourselves.

The University of Shiraz was incorporated in 1956. It took in the Faculties of Literature and Agriculture which were inaugurated in 1955, and the Faculty of Medicine which was inaugurated in 1948. In the Medical School we have, since 1956, made some necessary changes in curriculum, chiefly in the basic science years of training, where we have in the past been particularly weak. We are still weak in this category, though progress has been made with the help of Iranian government funds (the University of Shiraz is a government institution) which enabled us to acquire some basic equipment and the services of young and enterprising professors from England and Canada. From our standpoint it is interesting to note that these professors of physiology, biochemistry, anatomy, and pathology work

on a full-time basis, and that we are the only medical school in Iran with professors in these disciplines working full-time. Also, because of our previously mentioned belief in the necessity for Anglo-American methods of teaching, we have a requirement that our students pass an entrance examination in the English language before admission. There are, by the way, five medical schools in Iran, but we alone require a knowledge of English. Our reason for this is obviously because English has become the international language in science and medicine.

It is said that there are about 3,000 doctors of medicine practicing in Iran. This means approximately one to 6,900 persons compared with 6,000 in India and less than one to 1,000 in England. The large majority of our doctors are located in the large cities, leaving our rural areas without practising doctors.

Our students (with 35–40 in each class, chosen from an average of 600 applicants) are acknowledged by our foreign professors to be both bright and eager to learn. The students of today, however, still labor under the handicap of early instruction based on learning by rote rather than combining the facilities of a good memory with the essential ability to seek out cause and effect. In other words, the ability to think for themselves as well as to memorize is still a problem for many.

For training in the clinical years we are fortunate to have affiliated this year with the private Nemazee Hospital in Shiraz—a modern hospital, even by American standards, which was built by Mr. Mohamad Nemazee of Shiraz, a philanthropist who has thus contributed much to his country. The hospital is staffed by American doctors and Irani an doctors trained in the United States, and they are on a full-time basis, which is a rarityin Iran. This hospital has a 250-bed capacity, with 125 beds open at present. Iranian government funds are being sought to open up the remainder of the beds so that a sizeable number of indigent patients may be cared for. For teaching purposes we also use the 200-bed Saadi Hospital, a city institution which, while sadly lacking in equipment, facilities, and personnel, offers excellent clinical material. Many of the common diseases we have, such as cirrhosis and anemia, would appear to stem from malnutrition. This points up our need for greatly expanded research. The Saadi is a free hospital.

Administratively, we likewise have far to go before we as a Medical School can be compared in efficiency to an American medical school. Here, again, we need help from our American friends in teaching us successful methods of operation which can be adapted here.

The above paragraphs will, I hope, give you a brief view of our thinking regarding medical education in Iran, and some of the problems we face.

Again, may I thank you for helping us through the *Journal of Medical Education*.

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ABSTRACTS FROM THE WORLD OF MEDICAL EDUCATION

Hospital Medicine in Russia. J. B. HARMAN, M.D. The Lancet, pp. 725–27 (April 4), 1959 (London).

Dr. Harman's principal objective during this 17-day visit of hospitals in Moscow and Leningrad was to explore Soviet hospital medicine at its best, with special attention to anything new emanating from research. In Russia, the visitor was shown what he needed to see: a dozen institutions including a new district hospital, an old-established town hospital (with students and with research staff); university hospitals (comparable to British teaching hospitals); and institutes of hematology, neuropsychiatry, internal medicine, cancer, and endocrinology. These institutes, although in many aspects similar to the corresponding British ones, differ from the latter in development and emphasis. They are almost all new, serve primarily for research, have a small hospital attached, and are in close contact with similar institutions all over the Soviet Union. The visitor gained the impression that Russian medicine was "of good sound stuff from the latest textbooks." He did not find any original features. The cases dealt with were the same as seen in equivalent Western hospitals; diagnoses were made the same way; the same drugs are used for the same reasons, and the usual investigations were performed. However, the author found also that "a little harmless nonsense" was practiced, such as dry cupping to prevent pneumonia or inhalations of garlic for bronchiectasis, and a high regard for spa treatment (all of which are probably relics of continental medicine of the '20s). The routine laboratories were small, and decentralized to each department. Electrical equipment seemed somewhat old-fashioned and x-ray therapy very limited. Although the Russians have been for many years completely familiar with international medical literature (all important articles are translated, abstracted, and widely distributed), their use of such innovations as antibiotics, corticosteroids, and radioactive isotopes has been delayed. The reason is that they have to learn techniques from description rather than from experience and must wait for their own industry to produce the drugs. What struck the visitor most about medical Russia was its "Englishness." Practice, he found, was the same as in any good English hospital. Patients were managed the same way as there ("underinvestigated" by American standards). In the clinical field, he hardly met a single new idea, neither good nor foolish. Except in psychiatry, all he saw was orthodox medicine, accepted with no hint of curiosity, criticism, or enthusiasm. All information was imparted with great courtesy, but very few attempts were made to extract information from the visitor. As to psychiatry and psychosomatic medicine (the only exceptions to the surprising "sameness" the visitor had found), Russian dogmas, the author states, "are as rigid as ours." Freud's views are anathema (because of being "idealist"); sex is considered to play little part in psychopathology; the influence of heredity is muted, and the accent is on environmental factors. From Pavlov a materialistic approach has been derived which completely fits Russian ideological demands. Pavlov's work has been continued in physiology by Professor Bykow and others and applied to psychosomatic medicine by Spiranski. While the Western concept of psychosomatics is based on the belief that emotions can alter the functions of various

organs and lead to gross permanent pathological changes, the Russian emphasis in this field arose from observation of the changes in organ function that occurred during cortical stimulation and inhibition, and the conditioned dog is still the basis for experimental preparation. The central object of research is the study of the integration of the whole organism. As to therapy, it is not very different from Western methods, although different reasons for it may be offered. Insulin treatment is widely used, electroconvulsion only sparingly. Leucotomy is forbidden. Sedative and stimulant drugs play the same role as on this side of the Iron Curtain, but considerable use was made of an electrosleep machine. Psychiatry (always greatly influenced by the prevailing culture) being the only field in which Soviet medicine has produced some original ideas and followed their own lines of research, the question arises whether in the near future their work in this branch will have to be taken into account. In the author's view, at least a decade will pass before significant contributions can be expected.

La Nouvelle Faculté de Médecine et de Pharmacie de Marseille. J. H. CORRIOL. La Presse Médicale, No. 7, pp. 275–77 (Feb. 7), 1959 (Paris).

In the Spring of 1958, the Faculty of Medicine and Pharmacy at the University of Marseille inaugurated several new buildings which will enable the school to carry out in adequate conditions its mission in teaching and research. Mr. Corriol, a member of the school's teaching staff ("Maître de Conférences") tells in this article the story of these vast new buildings, emphasizing the principles which oriented their planning and the various original features they show. From 1930, year of its establishment, to 1958, Marseille's Faculty of Medicine had been housed in the Palais du Pharo, a palace built originally for Empress Eugénie, grandiose but totally inadequate for the needs of teaching and research, while its Pharmacy Department and medical laboratories were crowded into an ancient monastery at quite a distance from the school. The new buildings, which regroup all the disciplines in a coherent ensemble for teaching and research, are situated in the heart of Marseille's vast hospital area *de la Timone*. The exterior and interior features of the new construction, some of them complete innovations in university architecture are described in detail and illustrated by numerous pictures.

The Present Medical Curriculum as a Preparation for General Practice. P. HENTELEFF, M.D. Le Journal de L'Association Médicale Canadienne, No. 7, pp. 512–13 (April 1), 1959.

The case of a recent graduate who gave up general practice after 1 year because he felt he "was cheating people all the time" induced the author to question whether the actual medical curriculum provides adequate preparation for general practice. There are three aspects to the medical curriculum: (*a*) lectures about current medical knowledge; (*b*) clinical experience in dealing with patients; and (*c*) professional indoctrination in the nature of medicine, the place of research, the role of the specialist, medical ethics, etc. The lectures are a survey of the knowledge of disease given by specialists who usually put emphasis on the complexity, multiple aspects, and rare cases of a disease. Clinical work follows the same pattern: Patients are classified according to disease, and the student approaches them as cardiac, urological, or orthopedic cases rather than as *people* in a human setting. Clinical interest for the sake of knowledge is mainly directed toward rarities, and little opportunity is given to experience in which the patient's interest is really put first. Furthermore, a medical school, according to the author, "clatters with the importance of appointments and higher degrees and . . . is redolent of derogatory attitude to general practice." Resulting from this is the notion of *failure* in anyone who does not enter the competition for honors. Frequently one

hears about doctors "drifting into general practice" (actually, the author points out, it is far easier "to drift" into specialization"). The pressure to specialize is felt most acutely by Canadian graduates within the first 3 months after leaving school, when the intern must decide whether he is to apply for a senior internship in one of the specialties, or else will be left to an unknown fate in general practice "for which there are no application forms." Although nobody can deny that "academic medicine" is the perpetual source of medical progress, too great an emphasis on this aspect distracts the student's interest from the practical side of medicine. And still more detracting from general practice than an overwhelmingly academic atmosphere are certain innuendos frequently heard during clinical work, such as: "This patient first seen by his family doctor . . ." (with the implication that the patient has been misdiagnosed, mismanaged, overtreated or undertreated, etc.). The essence of this kind of derogatory hints is the often repeated statement that "medicine is now too vast and too complex for any one man to master." Although this may be true from the academic standpoint, which refers to the totality of medical knowledge, from the practical viewpoint it is a statistical misrepresentation which denies the usefulness and value of knowledge of 80–90 per cent of all medicine (some general practitioners who have analyzed their cases found that they have managed 80–90 per cent of all the illnesses confronting them). In his conclusions, the author points out that to solve the problem of the young general practitioner a radical change of attitude toward general practice in most Canadian schools is the first need. Another most essential requirement of the present medical curriculum would be "exposure to general practice." A *preceptorship* of 3 months is recommended to give the student an opportunity to get acquainted with a general practitioner's work. Furthermore, a greater cooperation of medical schools with the *College of General Practice* is necessary, and it is suggested that medical schools give teaching positions to a few general practitioners who would fulfill three functions: (*a*) to demonstrate to all students the nature of general practice and its place in medicine; (*b*) to balance the academic and highly specialized side of medicine; and (*c*) to guide those students who, in spite of the pressure to specialize, are willing to enter general practice.

Réflexions sur le Langage Médical. Le Point de Vue du Traducteur Scientifique (Reflections on Medical Language from the Science Translator's Point of View). H. VAN HOOF. La Presse Médicale, No. 11, pp. 419–21 (Feb. 28), 1959 (Paris).

Medical and pharmacological research during the last 25 years has seen a period of discovery, and the multitude of new theories and techniques have naturally also affected the vocabulary of the sciences—to such an extent, however, that today even the doctor or the pharmacologist sometimes gets lost in the terminological maze of what could be called "the most incorrect of all scientific languages." If such is the case for the trained professional, what about the difficulties a science translator confronts? Medical language today does not merely consist of a certain specialized vocabulary: not only has it become a professional jargon containing highly technical terminology, with semantic extensions or restrictions and a plethora of neologisms, but it has gone so far to endow words with new functions and to adopt a style absolutely *sui generis*. Furthermore, the intensive specialization which prevails in contemporary medicine has given birth to a good deal of vocabulary restricted almost exclusively to a given specialty. In such a situation, the science translator has to solve a never ending series of difficulties which are described in detail in this paper. In the first place, he must be constantly aware of the pitfalls of etymology, and a translator who relies on his knowledge in Greek and Latin to help him identify and understand a word, by going back to its etymological origin, would only deceive him-

self. Medical language today shows little respect for the rules and laws of etymology and orthographic transposition. The translator, furthermore, must find his way through the "maquis" of synonymy since, the author tells us, medical language constitutes today perhaps "the most beautiful pathological case of synonymic proliferation which could be imagined." Countless are the concepts designated by several expressions which, although equivalent, differ depending on whether they are considered from the anatomical, clinical, pathological, or even the historical and geographical point of view. (The historical denomination *Hodgkins disease*, for example, is found also under the names of malignant *granuloma, lymphoma, lymphadenoma, anemia lymphatica* or *pseudo leukemia*), and the synonyms are not always transposable from one language to another. The translator, after an intensive study of international medical literature, might be able to solve his dilemma by selecting the synonym most commonly used by those for whom the translation is meant. Thus, the English *rheumatic fever* (with its synonyms *acute articular rheumatism* and *polyarthritis rheumatica*) would correspond in the French translation to *maladie de bouilland* or, perhaps, to *rhumatisme articulaire aigu*, the most common French denominations, and not to the seemingly more exact terms *fièvre rhumatismale* or *polyarthrite aiguë*, which also exist but are much less frequently used. The translator, after having overcome the hurdle of synonymy, has yet to solve the brainwrecking puzzle of *abbreviations;* the problems originated by the *loan words* and the numerous gaps in the technical dictionaries. As to these last ones, in a domain as fluctuating as medicine today, when every day brings a new harvest of discoveries, new techniques, and improvements in research and therapeutic methods, it is no wonder that lexicographical works become obsolete even before having left the presses. Of course, one always can find there nomenclatures for anatomical terms and the common diseases and their symptoms. A translator, however, who is looking for the equivalent, in any language, of, say, the English *motion sickness trigger factor*, or the adjective *ataractic* (applied to a series of new drugs), etc., would find himself at a complete loss. It is not only the total absence of new specialized terminology from the dictionaries which hampers the medical translator, he also will be greatly annoyed by the difficulties he is bound to meet when looking for terms as innocent in appearance as, for instance, the English "history," "case history," "approach," "dosage," "ready for use," etc., which in a medical or pharmacological context may assume at any time new and surprising meanings the equivalent of which another language might lack completely.

Undergraduate, Postgraduate, and Graduate Medical Education in Canada. JOHN W. SCOTT, M.D. Journal de L'Association Médicale Canadienne, No. 7, pp. 524–25 (April 1), 1959.

There are twelve universities in Canada in which the complete course of undergraduate medical education—that is, the teaching leading to a M.D.—is carried out (in the same issue, pp. 525–35, can be found a brief survey of the undergraduate courses offered in each of these Canadian universities). Requirements for admission vary slightly, but all these schools require a period of premedical college or university training (2–4 years) which must include certain subjects (such as physics, chemistry, and zoology, among others). The medical course comprises either 4 or 5 years of training before a student can qualify for a degree (the 5th year is required in some universities for practical training in an affiliated teaching hospital and is credited to the student as a *junior intern year*, a requirement for licensure in all Canadian provinces). Teaching in most Canadian schools is based on the philosophy that the period of undergraduate training is aimed at giving the student a basic training in medicine, and not at preparing, or directing, him toward any special field, general practice included. However, it

is hoped and assumed that after acquiring his degree the ex-medical student will become a student of medicine during a period of graduate and postgraduate training—and, indeed, throughout all his professional life. Graduate medical education means, usually, in Canada, a course (of at least 1 year) of continuous training in a university basic science department, hospital, or clinic. During the first year of graduate training (commonly known as *junior internship*) in a hospital approved by the Canadian Medical Association, the student decides generally whether to pursue graduate training for a career in general practice or as a specialist, and the length of further training depends on his special field of interest (at least one more year is necessary to qualify for general practice). After his *junior internship* a student may also decide on an academic career in teaching or research in one of the basic medical sciences. In this case, the usual procedure would be for the student to associate himself with a university department in his field of interest and work toward a graduate degree (such as M.Sc. or Ph.D.). Postgraduate education (that is, usually, short courses given by university hospitals or other medical organizations to M.D.'s already in practice) is a process continuing during the physician's lifetime. Short courses of the "refresher" or "circuit" type are offered by Canadian medical schools and the larger teaching hospitals. Most valuable are also regional and general meetings of national medical organizations which generally provide an excellent stimulus to "continuing medical education."

NEW BOOKS

KENNETH E. PENROD
Book Review Editor

Reviews

The English Health Service—Its Origins, Structure and Achievements. By HARRY ECKSTEIN. Cambridge: Harvard University Press, 1958. 283 pp. $5.50.

Professor Eckstein, who teaches Government at Harvard University, provides a critical but impartial account of the National Health Service in Great Britain. The Health Service, commonly referred to in this country by the changed title "Socialized Medicine," is revealed in its proper light as being not a *de novo* brain child of the 1948 Labor Government, but an expansion of the outdated and less comprehensive National Health Insurance Act of 1911. Dr. Eckstein looked for, but was unable to find, significant deterioration of the doctor-patient relationship —a situation possibly due to the key role which the general practitioner has been allocated in the scheme. Shortage of medical supplies, poor organization, and limitations imposed by large-scale planning are represented as serious shortcomings of the scheme. Dr. James Howard Mears concludes the Foreword: "This book can be of great value, particularly to the American reader. . . . Medical care in America is bound to undergo evolutionary changes along with other features of the culture. . . . We have it in our power to guide this evolution somewhere, and possibly even with wisdom. The British medical venture is not something for us to imitate blindly. If we are accurately informed, however, we can learn from it, profit by it, and build our own structure with the successes and failures of the British in mind."

E. CROFT LONG
Duke University

Abstracts

The Biochemistry of Clinical Medicine. By WILLIAM S. HOFFMAN. 2d ed. Chicago: The Year Book Publishers, Inc., 1959. 699 pp. $12.00.

The second edition of this textbook has undergone extensive revision. Many new topics that have only recently become clarified enough to be included in textbooks have been added and many sections have been completely rewritten. A number of new tables and figures have been added. Yet the aim of the book has remained the same; namely, to present in a lively and readable manner the important and fundamental biochemical aspects of clinical medicine, so as to help the physician who has no more than the usual training in chemistry and physiologic sciences to understand and apply the available information for diagnosis, prognosis, and treatment. The integration is at the clinical rather than the chemical level. It is written from the point of view of a biochemically trained clinician rather than a clinically minded biochemist. The style is that of the clinical essay, with emphasis on biochemical dynamics in relation to the clinical course of the disease.

Diagnostic Biochemistry. By HALVOR N. CHRISTENSEN. New York: Oxford University Press, 1959. 258 pp. $6.50.

This book may be recommended either as a supplementary text for a first course in biochemistry that penetrates vigorously into the diagnostic area or for an advanced course for students who have had the more ordinary first course. At the same time the needs have been kept in mind of the physician who wants to reconsider the subject briefly from the ground up to improve his comprehension of biochemistry. The text may also serve to supplement hematology and clinical microscopy texts for instruction in laboratory diagnosis. In line with these objectives an attempt has been made to limit the present discussions to what may be more or less central areas of each subject, and to leave the discovery of some of the peripheral information to the student and to assign him questions that will cause him to further explore the central ideas. The latter is accomplished by including at the end of each chapter a series of library problems designed to send the student to the literature

sources for further information. Some discussion of library techniques has been included in the first chapter to pave the way for this exploration. In this way a simple course in library is integrated with biochemistry. Accordingly, this book is not written as a sole source of biochemical information but is to serve as a guide to the students interested in the pursuit of further knowledge utilizing library facilities.

Medical and Surgical Nursing. II. By Amy Frances Brown. Philadelphia: W. B. Saunders Co., 1959. 813 pp. $8.00.

This textbook is, as the title implies. a one-volume book for the later units in medical and surgical nursing. The author and contributors have attempted to include in any chapter the basic essentials within the particular topic. However, limitations are recognized, and complete coverage is not implied. This volume is concerned primarily with the care of adult medical and surgical patients. Thus, the subjects of congenital deformities, cerebral palsy, and other conditions effecting children have been omitted. An attempt has been made to make this textbook a reference for the practicing nurse as well as a textbook for students. A reasonably wide list of references is included with each chapter.

Natural Selection and Hereditary. By P. M. Sheppard. New York: The Philosophical Library, 1959. 200 pp. $6.00.

This book deals with some recent ideas on the mechanism of evolution in the light of modern genetics. Because of the importance of genetics and evolutionary theory, two chapters explaining the elementary principles of heredity have been included, in order to help those with no previous knowledge of this subject. Because of the enormity of the information available, only certain subjects which illustrate important principles of natural selection have been treated in detail. As a consequence, many subjects have been left out, such as the evolution of sex determining mechanisms, selection in bacteria, hybrid vigor, the nature of the gene and human evolution, to mention only a few. The author has been guided by three principal considerations in writing this book: (1) to explain principles, (2) to avoid giving the impression that most problems concerned with natural selection are solved and that controversy no longer exists, and (3) to reach a standard sufficiently advanced to allow those who wish to follow up the ideas of this book to do so by reading original papers.

Microbiology. By Louis P. Gebhardt and Dean A. Anderson. 2d ed. St. Louis: The C. V. Mosby Co., 1959. 446 pp. $5.75.

Extensive revisions have been made in this edition in line with major developments that have taken place since 1954. Many sections have been rewritten, and a few entirely new chapters have been added. The nomenclature has been changed where necessary to agree with the 7th edition of *Bergey's Manual of Determinative Bacteriology*. The number of illustrations has likewise been substantially increased. Again an attempt has been made to present the basic concepts of microbiology in a manner understandable to the general student who lacks extensive background in the biological and physical sciences. In addition to presenting the essentials of microbiology of use to the general student, technical material is also presented which will meet the special microbiological needs of the prospective high school and junior college science teacher and of students in nursing, home economics, pharmacy, and sanitary science.

Greek and Latin in Scientific Terminology. By Oscar E. Nybakken. Ames, Iowa: Iowa State College Press, 1959. 307 pp. $5.95.

This book, in its broader aspects, deals with the subject of communication in science. In its narrower aspect, and most particularly, the book deals with the role of Greek and Latin languages in the construction of the technical terms, names, and special epithets used in the medical and biological sciences. Some consideration is given to a few of the more common linguistic and practical factors that relate to the structure, meaning, and pronunciation of scientific terms. The scope and arrangement of its contents are such that the book may be used for supplementary work in courses in language or in science, or it may be used as a textbook for a special course in the derivation of technical terms of science and medicine.

Books Received

Principles of Self-Damage. By Edmund Bergler. New York: Philosophical Library, 1959. 459 pp. $6.00.

The Upper Atmosphere. By H. S. W. MASSEY and R. L. F. BOYD. New York: Philosophical Library, 1959. 325 pp. $17.50.

More about the Backward Child. By HERTA LOEWY. New York: Philosophical Library, 1959. 138 pp. $4.75.

Group Processes. Trans. 4th Josiah Macy, Jr. Conference, October 13, 14, 15, and 16, 1957. Edited by BERTRAM SCHAFFNER. New York: The Josiah Macy, Jr., Found., 1959. 252 pp. $4.50.

High Altitude and Satellite Rockets. A Symposium sponsored by the Royal Aeronautical Society, the British Interplanetary Society, and the College of Aeronautics held at Cranfield, England, July 18th–20th, 1957. New York: Philosophical Library, 1959. 134 pp. $15.00.

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NEWS FROM THE MEDICAL SCHOOLS

Boston

Dr. ROBERT R. MEZER has been named Coordinator of the Psychiatry Training Program at the Boston University Law-Medicine Research Institute. Dr. Mezer will also serve as assistant professor of legal psychiatry at the university's school of law, and as assistant professor of psychiatry at the school of medicine. The program involves training in forensic psychiatry for law and medical students and postgraduate residents in psychiatry at the school of medicine. In private practice since 1949, Dr. Mezer has served as senior staff psychiatrist at both the Southard and Community clinics of the Massachusetts Mental Health Center, and clinical director of the parole clinic, Division of Legal Medicine of the Massachusetts Department of Mental Health.

A Boston University professor has been named chief of the medical service with which he has served as a student, hospital resident and physician. In addition to heading the Home Medical Service, a teaching facility for the school of medicine and the Massachusetts Memorial hospitals, Dr. EDWARD F. MARRA has also been promoted to associate professor of preventive medicine. The Home Medical Service provides free medical care to indigent patients in Boston's South End and Roxbury districts.

University of Chicago

Professor DWIGHT J. INGLE has been appointed chairman of the department of physiology, succeeding Professor NATHANIEL KLEITMAN, who has been acting chairman of the department since the resignation of JOHN O. HUTCHENS September 30, 1958. Before joining the University of Chicago Laboratory for Cancer Research in 1953, Dr. Ingle spent 12 years with the Upjohn Company as research fellow and senior research scientist.

Cincinnati

The department of dermatology in the college of medicine and the college of pharmacy have begun a joint coordinated program designed to improve research, development and teaching in these two fields. Dr. LEON LICHTIN, associate professor of pharmacy, is in charge of the program. Cooperative research on more fundamental lines between the dermatology staff and the college of pharmacy's graduate department is being developed under Dr. Lichtin's direction. University administrators believe this is the first time this cooperative arrangement has been made with dermatologists-in-training actually taking courses at a college of pharmacy.

Colorado

With approval of an expenditure of $239,000 for development of plans by recent action of the Colorado Legislature's Joint Budget Committee, the $17.5 million building program proposed for the University of Colorado medical center has moved a step closer to reality. The proposed building program calls for a new 400-bed hospital, a research building, a dental school and expanded space for the school of medicine and the school of nursing. The medical center currently has $6 million in building mill levy funds for the project, and a matching grant of $1.3 million from the Public Health Service.

Three graduates of the Harvard Medical School are among the new full-time appointments to the faculty of medicine. Named professor and head of the department of radiology is Dr. DAVID M. GOULD, who

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currently holds a similar position at the University of Arkansas Medical Center. He succeeds the late Dr. RAYMOND R. LANIER. Appointed professor and head of the department of pathology is Dr. MORGAN BERTHRONG, pathologist at the Glockner-Penrose hospital in Colorado Springs since 1954. He succeeds Dr. JAMES B. MCNAUGHT, who has held this position since 1945. Dr. CONRAD M. RILEY will serve as full-time chief of pediatric service at Denver General hospital, with the rank of professor of pediatrics at the school of medicine. Dr. Riley, whose appointment becomes effective January 1, is currently associate professor of pediatrics at Columbia University College of Physicians and Surgeons.

The department of surgery is adding two full-time members to its staff with the appointment of Dr. VICTOR H. HILDYARD as assistant professor and head of the division of otolaryngology, and Dr. OLIVER G. STONINGTON as head of the division of urology. In private practice since 1957, Dr. Hildyard was clinical instructor in otology at the University of Southern California. Dr. Stonington, a Denver physician, has been a member of the volunteer faculty of the school of medicine since 1950.

Creighton

Appointment of Dr. RICHARD L. EGAN as dean of the school of medicine is announced by the Very Rev. CARL M. REINERT, S.J., university president. Dr. Egan succeeds Dr. FREDERICK G. GILLICK, who resigned to become director of medical institutions for the County of Santa Clara, Calif.

Dr. Richard Egan

A graduate of the Creighton School of Medicine, Dr. Egan joined the faculty in 1941 as an instructor and has been assistant dean since 1954. He also is assistant professor of medicine and director of Undergraduate Clinical Instruction. Currently serving as first vice-president of the Nebraska Heart Association, Dr. Egan was the organization's secretary last year. He is a trustee and member of the association's executive committee. In addition, he is chairman of the Health Council of United Community services in Omaha and is on the Executive Board of the Omaha-Douglas County Medical Society.

Michigan

Dr. WILLIAM N. HUBBARD, Jr., has been appointed dean of the University of Michigan Medical School The new dean succeeds Dr. ALBERT C. FURSTENBERG, who has headed the medical schools since 1935 and who started his retirement July 1.

Dr. W. N. Hubbard, Jr.

A graduate of Columbia University, Dr. Hubbard received his M.D. degree from New York University College of Medicine, where he joined the faculty in 1949 as The John Wychoff Fellow in Medicine. In 1951 he was appointed assistant dean and since July 1, 1953, he has been assistant professor of medicine and associate dean.

Dr. Hubbard is a member of the Harvey Society, the New York Academy of Medicine, and is an associate of the American College of Physicians.

Cornell

Dr. ROY CRAIG SWAN, Jr., has been named professor and head of the department of anatomy. Though Dr. Swan began his teaching career at Cornell in 1948, he filled a two-year interim appointment at the Harvard Medical School where he was research fellow in medicine. He returned to Cornell in 1952 as an instructor in medicine, and in 1955 was promoted to associate professor.

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Dr. Swan is currently treasurer of the New York State Society for Medical Research.

Construction of a research and library building for the medical college will be made possible by a recent grant of $1.6 million from the Samuel J. and Evelyn L. Wood Foundation of New York, together with a matching grant of $1.3 million from the Public Health Service. The new building will be a seven-story structure at 1300 York Avenue and will be named the Samuel J. Wood Library and Research Building. According to university officials, the additional space will permit the college to greatly expand the space now committed to research activities as well as greatly enlarging the library.

Missouri

Dr. VERNON E. WILSON, associate dean of the University of Kansas School of Medicine, has been named dean of the school of medicine at the University of Missouri. Assuming his duties November 1, he succeeds Dr. GWILYM S. LODWICK, who has been acting dean of the school since Dr. ROSCOE L. PULLEN resigned the deanship on March 24.

Dr. Vernon E. Wilson

Though Dr. Wilson intended to pursue a medical career upon entering Mount Morris College in 1931, his plans were interrupted by several obstacles including the closing of the college in the spring of 1932. Upon being discharged from the USNR in 1946, he resumed his plans by enrolling in the University of Illinois College of Medicine and its College of Pharmacology, earning three degrees—a B.S. in 1950, an M.S. (in pharmacology) in 1952, and an M.D. also in 1952. The following year he went to the University of Kansas as assistant dean of the school of medicine and assistant professor of pharmacology. He was promoted to associate dean of the school in 1957.

Dr. Wilson is currently assistant secretary of the AAMC.

New York Medical College

Dr. RALPH E. SNYDER, dean of New York Medical College, has been elected president of the institution by recent action of the Board of Trustees. At age 37, Dr. Snyder becomes one of the youngest presidents of an educational institution in the country. He was appointed dean in 1953 and has functioned as chief executive officer of the college since 1957. He will continue to hold the title of dean in addition to that of president.

Dr. Ralph Snyder

As president of the college, Dr. Snyder is also head of Flower and Fifth Avenue hospitals, which occupies an adjoining building on Fifth Avenue at 105th Street. He is also head of the Metropolitan Hospital Center, the city's newest medical center composed of the college, Flower and Fifth Avenue hospitals, Metropolitan hospital and Bird S. Coler hospital.

The college will celebrate its Centennial year in 1960 with a year long series of academic events beginning in the fall.

New York University

Groundbreaking ceremonies for the new University hospital of New York University's medical center took place July 7. The 19-story, 600-bed general hospital, to replace the present University hospital at 303 East 20th Street, will complete the NYU-Bellevue Medical Center $50 million development program started in 1948, and will contain on one campus all the facilities necessary for research, teaching, and the practice of the medical sciences.

A grant of $102,500 in addition to the

recent grant of $600,000 from the Lila Motley Cancer Foundation, Inc. will establish the Lila Motley Radiation Pavilion in the new hospital.

Dr. Goodwin M. Breinin has been appointed professor and chairman of the department of ophthalmology of NYU-Bellevue Medical Center. He has also been appointed director of the eye services of University and Bellevue hospitals and consultant to the New York Veterans Administration hospital. He succeeds Dr. Arthur G. DeVoe, who will become chairman of the department of ophthalmology at Columbia University College of Physicians and Surgeons. Dr. Breinin is the first incumbent of the Daniel B. Kirby professorship of research ophthalmology at the medical center and he will continue to hold that position.

Oklahoma

A Bill appropriating $400,000 for construction of a medical research building at the medical center has been passed by the State Legislature and signed into law by Gov. J. Howard Edmondson. The fund will be used to match a $400,000 federal health research facilities grant first awarded in 1957 and renewed pending the availability of local matching monies.

Pennsylvania Graduate School

Dr. L. Kraerr Ferguson, professor of surgery, has been appointed chairman of that department, succeeding Dr. Herbert R. Hawthorne who will become professor emeritus. Before coming to Pennsylvania, Dr. Ferguson held a similar position at Woman's Medical College.

Rochester

Dr. Alastair J. Gillies took over his duties in July as professor and chairman of the division of anesthesiology, a position formerly held by Dr. D. Vernon Thomas. Dr. Gillies received his undergraduate training and medical work in Edinburgh University, Scotland, serving his initial residency training at the Edinburgh Royal Infirmary. He came to the United States in 1951, and since 1955 has been at the Yale University School of Medicine as assistant professor of anesthesiology and associate director of the department in the Grace-New Haven Community hospital.

South Dakota

The South Dakota State Medical Association bestowed its Distinguished Service Award on Dean W. L. Hard at its annual meeting in June, in recognition of his services to medical education in the state.

S.U.N.Y. Brooklyn

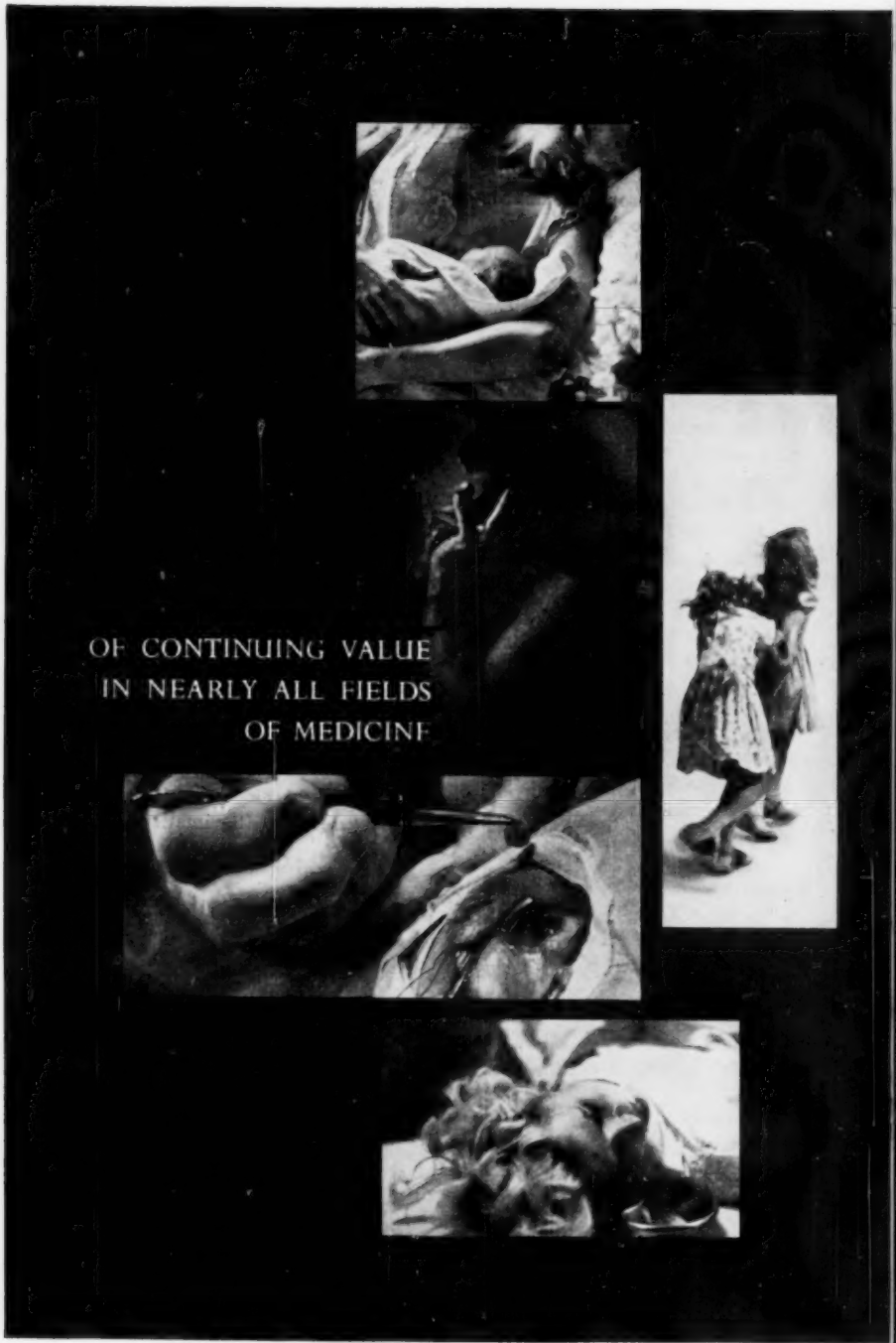
Recently appointed to the faculty of the Downstate Medical Center, Dr. George T. Mills of Glasgow, Scotland, will become associate professor of medicine. Also appointed to the same department as associate professor is Dr. Jacques M. Singer. Dr. Mills, who received the Ph.D. degree from the University of Liverpool in 1940, has been senior lecturer in biochemistry at the University of Glasgow. Dr. Singer's recent position was that of resident physician of the Neustadter Convalescent Center, Yonkers, research associate in medicine at Mt. Sinai hospital, and senior investigator for the Arthritis and Rheumatism Foundation.

Washington

New appointments to the faculty include Dr. Julian S. Ansell and Dr. N. Karl Mottet. Former chief of the division of urology at the Minneapolis Veterans Administration hospital, Dr. Ansell will head the division of urology as assistant professor of surgery. Dr. Mottet has been appointed head of surgical pathology for the new University hospital and assistant professor of pathology. He has been an instructor in pathology at Yale University, and was pathologist and director of laboratories at Griffin hospital, Derby, Conn.

Medical College of Virginia

Major administrative appointments have been announced by Dean William F. Ma-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Five years ago, in May of 1954, Smith Kline & French Laboratories made 'Thorazine' available to American physicians. Since that time, 'Thorazine' has exerted a profound influence in nearly all fields of medicine. The importance of the drug is apparent when it is realized that the dynamic "life" of most new drugs is less than two or three years, and that after five years 'Thorazine' remains one of the most extensively used therapeutic agents. Just as penicillin had a revolutionary and lasting impact on antibacterial therapy, 'Thorazine' has inaugurated entirely new therapeutic concepts and techniques in many fields of medicine.

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LONEY. Dr. ROBERT Q. MARSTON, assistant professor of medicine, has been named assistant dean, replacing GEORGE W. BAKEMAN, retired. Dr. W. T. THOMPSON, Jr., former chief of medicine at McGuire Veterans Administration hospital, Richmond, Va., will take over as professor and chairman of the department of medicine; appointed professor and chairman of the department of pathology is Dr. GEORGE MARGOLIS, formerly professor of pathology at Duke University Medical School.

Western Reserve

On September 1, Dr. JOSEPH T. WEARN will relinquish his duties as dean of the school of medicine to become vice-president for medical affairs, with primary responsibility for developing long-range financial support for the school. On that same date, Dr. DOUGLAS D. BOND, who has been director of the department of psychiatry since 1946, will become dean.

Dr. Douglas Bond

Dr. Bond was graduated from Harvard University in 1934 and received his M.D. degree from the University of Pennsylvania 4 years later. He has served in both administrative and consulting capacities in psychiatry to the Army, the Air Force, and the Veterans Administration. Dr. Bond is currently director of psychiatry for the University hospitals and is a member of the Public Health Service Advisory Committee on psychiatry. Writer of many articles on physiology and psychiatry, he is the author of the book, "Love and Fear of Flying."

A gift of $20 million—half to the Western Reserve School of Medicine and half to the University hospitals of Cleveland, a separate corporate entity with which the school is closely affiliated, has been made by the Leonard C. Hanna, Jr., Fund of Cleveland. The hospitals expect to use their grant primarily for construction of diagnostic, therapeutic and research facilities. The school will allocate approximately $3 million to match research facilities construction grants by the Public Health Service, and $7 million for endowment, the income to be used to improve faculty salaries. This will bring to more than $20 million the amount added to the endowment of the school of medicine since Dr. Wearn became dean.

Yale

Dr. EDITH B. JACKSON, child psychiatrist at the Yale School of Medicine, is retiring this summer after more than 25 years on the faculty.

A pioneer in the development of "rooming-in" for mothers and newborn infants, Dr. Jackson was director of this project at the Yale-New Haven Medical Center from 1946 to 1951.

Saskatchewan

The college of medicine has appointed a medical sociologist to the faculty, the only one of its kind in Canada, according to university sources. Made possible by a grant of $19,079, from the Commonwealth Fund of New York, the post will be filled by Dr. ROBIN F. BADGLEY, who will be an assistant professor in the department of social and preventive medicine. Dr. Badgley will be concerned principally with research in his subject and also with teaching social aspects of medicine to medical students and nurses.

ITEMS OF CURRENT INTEREST

AAMC 70th Annual Meeting

More than 35 of the nation's leaders in medicine, education, industry, and government will participate in a conference intended to help the medical educator keep apprised of the ever-present changes in the field of medicine.

Total attendance from the United States, Canada, and several foreign countries is expected to exceed 800 when the Association of American Medical Colleges holds its 70th Annual Meeting November 2–4 at the Edgewater Beach Hotel, Chicago, Ill. Theme of this year's meeting is "Medical Education in a Changing World." Dr. John McK. Mitchell, dean of the University of Pennsylvania School of Medicine and 1959 president of the AAMC will preside.

A 20-school study made by the National Institutes of Health will be reported by Surgeon General Leroy E. Burney. At that time Dr. Burney also expects to cover the work of the Consultant Group on Medical Education. Since the government-medical school relationship is an important issue, its future development is a point of interest.

Representing the pharmaceutical industry, Eugene N. Beesley, president, Eli Lilly and Company, will point out how progress in the discovery, preparation, and distribution of pharmaceuticals has played an important role in increasing the effectiveness of the preventive, curative, and symptomatic aspects of the past 10 years of medicine. The next ten years will undoubtedly see an acceleration of this kind of development. The industry and the medical schools together play an important part in keeping the practicing physician and the medical student aware of pharmaceutical developments.

Continuing a tradition, the Association's annual banquet will be held Monday evening, November 2. Warren Weaver, Ph.D., vice-president of The Rockefeller Foundation will be principal speaker. Presentations will be made to the winner of the Borden Award in the Medical Sciences and to the winner of the Abraham Flexner Award for Outstanding Service to Medical Education.

This year will mark the second meeting of the newly-formed Medical School-Teaching Hospital Section of the AAMC. Carrying out the Association's theme, the group will meet Friday and Saturday, October 30–31 at the Edgewater Beach Hotel. Attendance is limited to deans and their appointed hospital administrators.

The preliminary program for the 70th Annual Meeting has been distributed to all member medical schools and its individual members. Information regarding registration may be obtained by writing to the Association headquarters, 2530 Ridge Avenue, Evanston, Ill.

Seventh Teaching Institute to be Held

The second stage of medical education's exploration of problems in clinical teaching will be examined October 27–31, 1959, at the seventh Teaching Institute of the Association of American Medical Colleges, to be held at the Edgewater Beach Hotel, Chicago. The plight of the basic sciences, the education of house officers, and the controversial role of the behavioral sciences are fundamental issues in the 3-point program drawn up by the Planning Committee under the chairmanship of Dr. Charles G. Child, III, professor and chairman, department of surgery, University of Michigan Medical School. Attendance is by invitation only.

Dr. Charles G. Child

Following the tradition of previous Institutes, a number of distinguished guests from outside the medical disciplines will join the participants from each medical school in the United States and Canada for three days of general session and small-group discussion. Dr. Jacques Barzun, provost and dean of graduate faculties, Columbia University; Dr. Lee A. DuBridge, president, California Institute of Technology; and Dr. John G. Darley, executive secretary of the American Psychological Association, will be among the guest speakers at this year's Institute, according to Dr. Helen Hofer Gee, Director of Research, AAMC, and coordinator of Teaching Institutes.

Chairmen of the three subcommittees responsible for organizing Institute content include Dr. J. Englebert Dunphy, professor and chairman, department of surgery, University of Oregon Medical School; Dr. Eugene A. Stead, Jr., professor and chairman, department of medicine, Duke University School of Medicine; and Dr. Herbert S. Gaskill, professor and head, department of psychiatry, University of Colorado School of Medicine.

Dr. Isidor S. Ravdin, professor and chairman, department of surgery, University of Pennsylvania School of Medicine, will join Dr. Oliver Cope, associate professor of surgery, Harvard Medical School, in summarizing highlights of the Institute's proceedings for participants at the AAMC Annual Meeting immediately following.

The Report of the First Institute on Clinical Teaching will be published by the AAMC in a clothbound edition and as a supplement to *The Journal of Medical Education* in October, 1959.

Medical School Study Complete

A report summarizing the current status and future plans of 16 medical schools for their medical research activities has been made to Dr. James A. Shannon, Director of the National Institutes of Health by his Staff Committee on Support for Research and Training.

Carried out with the cooperation of the AAMC and the AMA, the study was undertaken to gather information useful in planning future Public Health Service programs affecting medical research and medical education. Although 20 medical schools cooperated in the inquiry, detailed information for the periods covered (1948 to 1959 and an estimate for 1970) was available from only 16 of the schools, nine publicly owned and seven privately owned institutions.

Entitled, "A Study of Twenty Medical Schools," single copies are available upon request by writing to the Chief, Office of Research Information, National Institutes of Health, Bethesda, Md.

Another Medical School for Texas

The Legislature recently passed a bill for the establishment of a third state medical school in Texas. To be located in Bexar County, the medical branch will be under the jurisdiction of the University of Texas, which now operates medical schools in Galveston and Dallas.

Residency Training Program Approved

The Pennsylvania State Department of Health has been approved by the American Medical Association as a residency in preventive medicine and public health for the training of physicians seeking to make that field their specialty.

State Secretary of Health, Dr. Charles L. Wilbar, Jr., reports that the Department is officially accredited for training physicians in public health practice by the Residency Review Committee of the Council on Medical Education and Hospitals of the AMA. According to Dr. Wilbar, the new residency will help meet the need for trained and competent health officers. Pennsylvania now joins 17 other states so approved. Physicians accepted by the Health Department for residency training will be required to complete a three-year program in the various phases of public health practice.

An appointment as resident to start January 1, 1960 in the Regional office in Reading, will be available this Fall. Physi-

cians interested are invited to write to Dr. Carl Kuehn, Director of Local Health Service, P.O. Box 90, Harrisburg, Pa.

MEND News

At a joint meeting in Atlantic City on June 8, the Federal MEND Council and the AAMC Committee on MEND approved the affiliation of 15 additional medical schools with that program, effective January 1, 1960. They are: Albany, Arkansas, University of Chicago, Hahnemann, Jefferson, Minnesota, Missouri, New York Medical College, South Dakota, Southern California, Tennessee, Utah, Wayne State, West Virginia, and Woman's Medical College of Pennsylvania.

With the new additions, a total of 70 medical schools will be participating in the MEND program.

License Stolen

John Philip Brady, M.D. has reported that his medical degree under date of June 15, 1925 given by the University of Michigan Medical School, has been stolen. Dr. Brady was licensed in Minnesota in 1929 and in Oregon in 1954. These are the only states in which he is licensed to practice.

Second Conference on Medical Electronics

At the Second International Conference on Medical Electronics held in Paris at UNESCO House in June, an official organization was formed to consolidate activities in this new field of applied science.

To be known as the International Federation for Medical Electronics, its object will be to encourage the development and dissemination of knowledge in medical electronics throughout the various countries. In order to do this, the Federation will sponsor international congresses at regular intervals, collect and publish literature, encourage research in medical electronics and generally foster international collaboration in the field.

National Foundation Allocates Funds

Expenditures totaling $1,010,486 to assist the educational programs of the medical and allied professions were recommended by the Advisory Committees of The National Foundation at their semi-annual meeting according to a recent announcement.

New for this year was the recommendation that $65,000 be authorized to provide fellowships for physicians and surgeons to study in the clinical fields of rheumatology and the management of congenital malformations of the central nervous system. Fellowships will be offered to residents or to more experienced physicians who desire this type of opportunity.

Government Notes

Department of the Army. . . . The United States Army Medical Service celebrated its 184th anniversary on Monday, July 27. On this date in 1775, the Continental Congress authorized the establishment of "an hospital" after General George Washington requested a medical department for his Army. Since that date, the Army Medical Service has been credited with achievements which have helped protect the health of the nation as well as the Army over the years.

On June 1, Major General Leonard D. Heaton was sworn in as the 30th Surgeon General of the Army Medical Service.

Air Force. . . . The School of Aviation Medicine will offer a new advanced course this Fall in aerospace medicine to senior medical officers from the Air Forces of our allies at its new headquarters, Brooks Air Force Base, Texas. Purpose of the course, in providing advanced training in the specialty of aviation medicine, is to prepare allied senior medical officers selected by their own servcies for professional responsibilities as aviation medicine consultants, investigators, teachers, and directors of the program in their respective Air Forces.

PERSONNEL EXCHANGE

Faculty Vacancies

PROFESSOR OF PREVENTIVE MEDICINE: The University of Alberta invites applications for the position of professor and head of the department of preventive medicine in the faculty of medicine. Duties will include administration of the department, teaching of graduate and undergraduate students and a program of research. Salary will be $10,000 per annum with consulting privileges. Interested applicants should send a complete curriculum vitae, names of three referees, and a recent photograph to the office of the Dean of Medicine, University of Alberta, Edmonton, Alberta.

PEDIATRICIANS: Two or 3 part-time teaching positions —may use remainder of time for private practice. Address: F. G. Gillick, M.D., Creighton University School of Medicine, Omaha 2, Nebraska.

PSYCHIATRISTS: Full-time and part-time teaching positions. Need coordinator of teaching grant program. Would function under departmental director. Address: F. G. Gillick, M.D., Creighton University School of Medicine, Omaha 2, Nebraska.

ASSISTANT PROFESSOR OF PREVENTIVE MEDICINE: Full-time appointment in department of preventive medicine with teaching and research opportunity, including comprehensive medical care teaching. Must have M.P.H. degree. Address: V-76.

FELLOW IN VIRUS RESEARCH: M.D., with at least one year of residency in pediatrics for training in diagnostic virology. Duties include approximately three hours of ward rounds, and five hours of training and research in the virus laboratory. The individual is expected to direct and consolidate activities in the clinical and research areas. Salary $6,000 per annum. Position available for 2-year tenure. Apply Dr. H. A. Wenner, University of Kansas Medical Center, Kansas City, Kansas.

IMMUNOCHEMIST OR BIOCHEMIST: Must be interested in field of infectious diseases. Activities include studies on immune mechanisms and on the biochemistry of virus infections. Full-time research position. Salary open; minimal $8,000. Apply H. A. Wenner, M.D., Section for Virus Research, University of Kansas School of Medicine, Kansas City, Kansas.

PSYCHIATRISTS: Newly organized department of psychiatry in east coast medical school needs full-time psychiatrists for research and teaching. Rank and salary are dependent on experience and qualifications. Address: V-77.

DIRECTOR OF MEDICAL EDUCATION: for new 350-bed hospital. New position. Internal medicine specialist preferred for full-time position. Beginning salary about $15,000 per year. Address inquiries to: Sister Administrator, Providence Hospital, Washington 17, D.C.

PHARMACOLOGIST: The University of Alberta invites applications for the position of Associate Professor of Pharmacology, effective not later than September 1, 1959, at a minimum salary of $8,000 per annum, with annual increments. Duties include undergraduate and graduate teaching and a program of research. Applicants possessing a medical degree, in addition to qualifications in pharmacology, will be given preference. Applications should include a recent photograph or snapshot, a curriculum vitae, and the names of three references, and should be sent to the Dean of Medicine, University of Alberta, Edmonton, Alberta, Canada.

PSYCHIATRIC SOCIAL WORKER: Position open on new child psychiatry inpatient service to be opened on July 1. Research and teaching will be emphasized in developing program. Preferred qualifications are Ph.D. degree or doctoral candidate with solid clinical grounding in psychiatric social work. Master's degree in Social Work with 5 years psychiatric clinical experience will be considered. Position carries academic appointment. Send curriculum vitae with application. Address: V-78.

PHARMACOLOGIST: Full-time appointment in department of pharmacology for assistant professor of pharmacology. Ph.D. or M.D., preferably the latter, and previous training in pharmacology required. Salary $7,000 or higher according to qualifications. Interested candidates should send a complete curriculum vitae and recent photograph to Dr. M. F. Murnaghan, Professor and Head, Department of Pharmacology, University of Ottawa, Ottawa 2, Ontario, Canada.

ASSISTANT IN PSYCHIATRY: Research assistant wanted for psychosomatic project from July 1, 1959. Associated university affiliation. Salary according to qualifications up to $5,700. Apply to Professor R. B. Sloane, Department of Psychiatry, Queen's University, Kingston, Ontario, Canada.

ENDOCRINOLOGIST-BIOCHEMIST: M.D. to become director of biochemistry laboratory at a 400-bed general hospital with medical school faculty appointment. Duties to include teaching; research will be encouraged. Large Eastern city. Address: V-79.

PHYSIOLOGIST: Full time appointment in physiology department of large medical school. M.D. or Ph.D. with training and research interests in cardiovascular physiology. Rank and salary (Instructor to Associate Professor, starting $6400 to $9000 plus, respectively) based on qualification and experience. Insurance, pension, travel allowance, relocation, other benefits. To assume post September 1. Address: V-80.

To aid in solution of the problem of faculty vacancies, MEDICAL EDUCATION will list persons and positions available, as a free service. The school department or person may have the option of being identified in these columns or of being assigned a key number for each position listed. Mail addressed to key numbers will be forwarded to the person or department listing the request.

Information for these columns should reach the Personnel Exchange, Journal of Medical Education, 2530 Ridge Avenue, Evanston, Illinois, not later than the 10th of the month which precedes the month in which the listings will appear.

Personnel Available

UROLOGIST: Foreign physician, age 30, one year internship, three years in urology and one in urological research in teaching hospitals of U.S.A. Desires position as preceptor in urology, starting July 1959. Good command of English. Address: A-390.

THORACIC SURGEON: M.D. 1947, University of Istanbul. Served an internship in surgery (1954–55) Montana Deaconess Hospital, Great Falls, Montana. Served as Fellow in Thoracic Surgery (sponsored by American College of Chest Physicians) Knoxville, Tenn. Presently in charge of thoracic surgery department at Armenian Hospital, Istanbul. Desires teaching position in American medical school. Address: A-391.

PATHOLOGIST: Age 35, married. Certified PA 1955. Academic background and three years teaching experience. Wishes to relocate in West. Will consider part-time or full-time teaching appointment. Especially interested in surgical pathology. Address: A-392.

OTOLARYNGOLOGIST and HEAD and NECK SURGEON: Age 32; board eligible. University of the Philippines graduate. Completed five and one half years' training in eastern medical centers (3 years otolaryngology, 6 months more bronchoesophagology, and 2 years general and head and neck surgery). Desires one year fellowship, or assistantship, or academic position. Available August or October, 1959. Address: A-393.

BIOCHEMIST: Ph.D., age 30. Assistant professor of biochemistry desires academic position. Five years medical and graduate teaching experience. Membership in national societies, honors, grants, graduate students. Fifteen full-length publications. Research interests: enzymology, microbial metabolism and protein metabolism. Available July 1, 1959. Address: A-394.

PHYSIOLOGIST-PHARMACOLOGIST: Ph.D., 1954. Male, married, with family. Presently teaching physiology in dental school. Desires teaching position with research opportunities in physiology or pharmacology department. Address: A-395.

PATHOLOGIST-BACTERIOLOGIST: M.S., B.S. (London University); M.R.C.S. (England) L.R.C.P. (London). Age 42, family; registered with British General Medical Council. Five years experience in general and clinical pathology and bacteriology, London, England. Completing 3-year contract in Jamaica. Desires academic appointment in U.S., preferably in the South. Available May, 1959. Address: A-397.

VIROLOGIST-PATHOLOGIST: Excellent experience and background in infectious diseases, human and animal viruses. Broad interests include cancer and pathogenesis. D.V.M.–Ph.D., age 34. Presently in industry. Desires research and teaching position. Would consider Senior Fellowship. Address: A-398.

INTERNIST-HEMATOLOGIST: Age 36, Board certified, with five years academic-type practice and previous research experience, seeks academic position in moderate sized city. Address: A-399.

PSYCHIATRIST: Female, age 26, completing final year of residency in June 1959. Training includes two years in an active university program and participation in family studies in schizophrenia. Analytically (Sullivanian) oriented. Special interests: Psychotherapy with schizophrenics, teaching professionals and non-professionals, liberal arts. Seeks position teaching in medical school with time for limited private practice. Interested in small university community. Address: A-400.

PHARMACOLOGIST: Ph.D., 1955; married, 3 children. Presently teaching pharmacology to medical students. Publications. Research interests: drug metabolism and toxicology. Desires teaching appointment in medical school that would provide opportunity for completion of courses leading to M.D. degree. Would continue teaching pharmacology after receiving the degree. Available August 1. Address: A-401.

INTERNIST: M.D. Age 33. Currently on faculty of eastern medical school. Experience in private practice and industrial medicine. Eight months experience and training in psychiatry. Desires faculty appointment with opportunity for clinical investigation in cardio-vascular diseases, as well as teaching general medicine, in teaching hospital. Address: A-402.

PATHOLOGIST: Wishes to join Pathology Department to contribute to, or help develop, a strong, well balanced teaching program with emphasis on best utilization of materials, methods and communication with students. Also interest and experience in basic research. Previous experience in undergraduate, graduate, and medical teaching, including several years in Anatomy (Ph.D.), followed by M.D., internship and specialization in Pathologic Anatomy (will complete July '59). Age 38. Desires permanent position with good opportunities in primary fields of interest. Address: A-403.

VETERINARIAN: Experienced in microbiological techniques; presently at a medical school. Desires position as director of experimental animal laboratory. Address: A-404.

MICROBIOLOGIST-VIROLOGIST: Ph.D., presently on university faculty. Five years experience in virology and tissue culture publications. Desires academic position involving full-time research or research and teaching. Address: A-405.

ORTHOPAEDIC SURGEON: 38. Wants appointment in U.S.A. or Canada. Main interest in Traumatic Surgery and Research. Now holding consultant post at well known British Hospital. Mastership in Surgery and Fellow of the Royal College of Surgeons. Address: A-406.

PSYCHIATRIST-NEUROPHYSIOLOGIST: M.D. Certified in psychiatry and as a mental hospital administrator. FAPA and FSPA. No formal training in neurophysiology but using some of its principles with gratifying results in coping with the manifold problems of psychosomatic medicine. Desires full-time career teaching position in medical school with opportunities for teaching psychiatry; for learning clinical neurophysiology well enough to instruct; and for carrying on more intensive course of clinical investigation. Address: A-407.

PHYSIOLOGIST: Ph.D., 1957, age 31, married, one child. Research in cardiovascular-renal physiology. Strong background in hypertension. Eleven publications. Experience in teaching medical, dental, and pharmacy students. Desires research position with or without teaching responsibilities. Address: A-408.

MICROBIOLOGIST: Ph.D., Sept., 1959. Training in all fields of basic microbiology, with research in microbial metabolism. Desires faculty position with teaching and research opportunities in a university or medical school. Address: A-409.

PHYSIOLOGIST-ENDOCRINOLOGIST: Ph.D., age 36. Training and background in endocrine, cellular, mammalian and zoological physiology. Presently assistant professor engaged in teaching and research in endocrinology and general physiology. Formerly research associate in biochemistry. Desires academic and/or research position. Address: A-410.

ANATOMIST: Age 34, married. Ph.D. Anatomy 1957. Publications. Teaching experience in Eastern medical school. Desires teaching position with opportunity for research. Address: A-411.

INTERNIST: Age 35, married. Ten years training in internal medicine and hematology. Teaching experience and research in field of clinical hematology, B_{12} metabolism, radioactive uptakes, experimental hematology, and enzyme studies. Desires teaching position with opportunity for research. Address: A-412.

SURGEON: Age 35, native of Bombay, India. In U.S. since 1952. F.C.P.S. (Bombay), F.R.C.S.E. (Edinburgh). Completed residency training in general surgery in U.S. and successfully taken Part I examination of American Board of Surgery. Desires full-time position in teaching and/or research in American medical school. Presently senior resident in surgery in Eastern hospital. Experience in plastic surgery as well as urology and anesthesiology. Address: A-413.

UROLOGIST: University trained, finished 1956. Seeking full-time academic post: teaching, research, and clinical work. Presently in private practice and part-time university teaching. Address: A-414.

GROSS ANATOMIST: D.S.D., Ph.D. Ten years teaching experience in medical school; previously taught in dental school. Clinical experience in plastic and oral surgery. Research interests and publications: homotransplantation of tissues. Desires academic position in medical or dental school with research facilities. Will consider research associateship with plastic surgery department. Address: A-415.

MICROBIOLOGIST: Ph.D. Seeking position on medical school faculty in Southeast or Southwest. Many years experience and supervision in clinical microbiology. Six years on medical school faculty. Qualified in parasitology, virology and public health. Address: A-416.

INTERNIST: Age 31, now completing third year of residency in internal medicine. Desires position as director of medical education in teaching hospital. Well trained in basic patho-physiology and have assisted director of medical education at current hospital. Particularly interested in setting up and conducting a new program. Address: A-417.

SURGEON: Age 33. Certified in surgery and thoracic surgery. University trained with research background. Presently holding part-time university teaching appointment. Desires full-time academic appointment in surgery, preferably with additional duties as assistant dean working with curriculum and postgraduate training program. Address: A-418.

INTERNIST-GASTROENTEROLOGIST: Age 42. Board certified in internal medicine and in gastroenterology. Training and experience include 4 years as Mayo Foundation Fellow, full-time instructor in gastroenterology in leading university, clinical investigation and private practice. Trained in all gastroenterological techniques and bone marrow interpretation. Qualified in hematology, peripheral vascular diseases and rheumatology. Desires academic position in internal medicine, gastroenterology, comprehensive medical care section, as Assistant Dean, or as Director of Medical Education in teaching hospital. Address: A-419.

MICROBIOLOGIST-CLINICAL PATHOLOGIST: M.D., Ph.D., age 54, married. Wide experience in teaching and research in the United States. Returning after several years of teaching in medical schools in the Far and Middle East. Textbook in course of publication. Desires research or teaching position in medical school or in teaching hospital. Address: A-420.

PATHOLOGIST-VIROLOGIST: DVM, Ph.D. Experience in comparative pathology, virology and tissue culture techniques. Also considerable experience in teaching experimental pathology to medical students. Desires teaching appointment in a medical school that would provide opportunity for completion of courses leading to M.D. degree. Address: A-421.

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Designed for everyday practice, PROZINE controls motor excitability as well as anxiety and tension by acting on both the hypothalamic and thalamic areas of the brain. Because of this dual action, dosage requirements are low, side-effects minimal.

1. Case reports on file, Wyeth Laboratories. 2. Parks, R.V., and Moessner, G.F.: Dual Approach to Patient Care. Scientific Exhibit, A.A.G.P., April, 1959.

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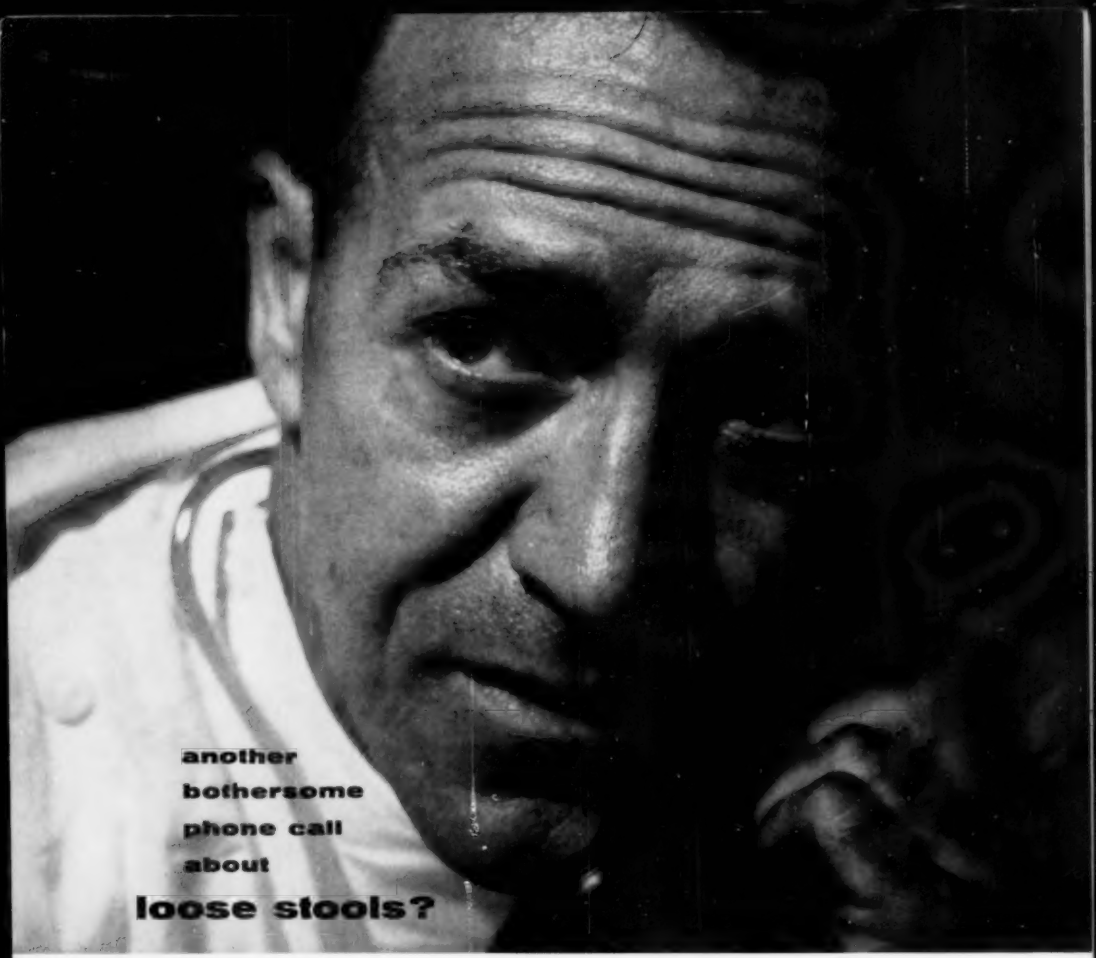

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Low Incidence of Loose Stools in Hospital Study[2]

In a clinical study of 180 sick and 10 well infants fed Lactum, the investigator reported: "There was no diarrhea in any of the infants except in those patients whose diagnosis on admission was infectious diarrhea . . . we have been convinced that inclusion of adequate added carbohydrate in . . . [Lactum] during stress periods, such as diarrhea, is definitely advantageous."

Incidence of Loose Stools Negligible[2] 190 Hospitalized Infants

Age	No. Cases	Loose Stools†
Birth	14	0
1 mo.	36	0
2 mo.	27	1
3 mo.	12	1
4 mo.	10	1
5 mo.	14	0
6 mo.	8	0
7 mo.	19	0
8 mo.	11	0
9 mo.	10	0
10 mo.	8	0
11 mo.	11	0
12 mo.	10	0
	190	3 (1.6%)

†Exclusive of infants admitted with infectious diarrhea

1. Frost, L. H., and Jackson, R. L., J. Pediat. 39:585-592 (Nov.) 1951.
2. Henrickson, W. E.: GP 8: 51-56 (Oct.) 1953.

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